TRANE ®

Hardware Installation

Tracker™ Version 12
Building Automation System

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NOTICE:

Warnings and Cautions appear at appropriate sections throughout this manual. Read these carefully:

⚠WARNING

Indicates a potentially hazardous situation, which, if not avoided, could result in death or serious injury.

⚠CAUTION

Indicates a potentially hazardous situation, which, if not avoided, may result in minor or moderate injury. It may also be used to alert against unsafe practices.

CAUTION

Indicates a situation that may result in equipment or property-damage-only accidents.

The following format and symbol conventions appear at appropriate sections throughout this manual:

IMPORTANT

Alerts installer, servicer, or operator to potential actions that could cause the product or system to operate improperly but will not likely result in potential for damage.

Note:
A note may be used to make the reader aware of useful information, to clarify a point, or to describe options or alternatives.

◆   This symbol precedes a procedure that consists of only a single step.

Contents

Chapter 1
Overview

The Tracker building automation system (BAS) is an energy management system for small- to medium-size buildings. The Tracker BAS controls heating, ventilating, and air conditioning (HVAC) equipment. It consists of a Tracker controller (Figure 1) and an optional PC workstation.

The Tracker BAS can be operated by using either a Tracker controller or a PC workstation that is running Tracker PC Workstation software. A visual interface enables an operator to set up and change HVAC operating parameters and to collect and display building information. The Tracker PC Workstation software allows a PC to be connected to the Tracker controller directly with a prescribed adapter and cable, locally over a standard Ethernet local area network (LAN) connection, or remotely with a modem and standard phone line.

The Tracker BAS supports Comm5 communications architecture, which is the Trane implementation of LonTalk® protocol. It resides on a network (Figure 2 on page 2 and Figure 3 on page 3) that includes HVAC and other comfort-related equipment, such as Trane VariTrac zoning systems; zoning controls; unit control modules (UCMs), which control and monitor other HVAC equipment; Tracer LCI-V (LonTalk® communication interfaces for Voyager rooftop controls); Tracer LCI-R (LonTalk® communication interfaces for ReliaTel rooftop controls); external input/output (I/O) devices, which help to monitor and control specific areas or devices; and miscellaneous equipment such as sensors, lights, and fans.

Figure 1. Tracker controller
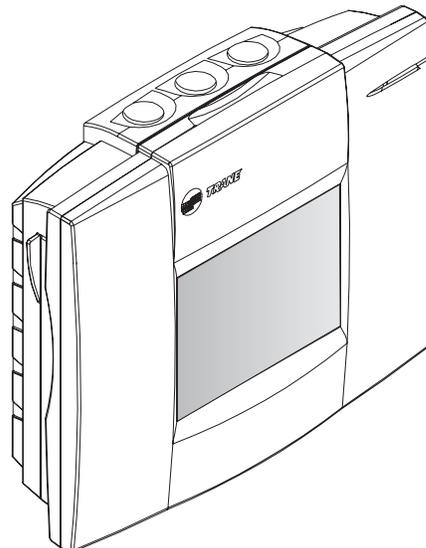
Figure 2. Example Tracker building automation system (models 12 and 24) on a network

VariTrac or VariTrane
zone dampers

Voyager constant
volume rooftop

Voyager rooftop

Precedent rooftop
with ReliaTel controls

Interconnecting wiring
(Comm5 link): single, twisted
pair, shielded wire for two-
way communication.

TCI-V

VariTrac central
control panel

Tracer
LCI-V

Tracer
LCI-R

Utility pulse meter input

Outdoor air
temperature sensor input

Priority shutdown
contact input

Alarm relay output

Universal inputs

Binary outputs

Tracer MP503
I/O module

Analog inputs

Binary inputs

Binary outputs

Tracer ZN517
unitary controller

Generic rooftop

Tracker
controller

Tracker
PC Workstation

Direct, dial-in (modem),
or Ethernet connection

Figure 3. Example building automation system (water-source heat pump) on a network

Tracer loop controller
(for water-source
heat pump)

Tracer ZN510, ZN511, or
ZN524 controller

← Analog inputs

← Binary inputs

Binary outputs →

Voyager constant
volume rooftop

Precedent rooftop
with ReliaTel controls

Interconnecting wiring
(Comm5 link): single, twisted
pair, shielded wire for two-
way communication.

Tracer
LCI-V

Tracer
LCI-R

Utility pulse meter input

← Universal inputs

← Analog inputs

Outdoor air
temperature sensor input

Binary outputs →

← Binary inputs

Binary outputs →

Priority shutdown
contact input

Tracer MP503
I/O module

Tracer ZN517
unitary controller

Generic rooftop

Alarm relay output

Tracker
controller

Tracker
PC Workstation

Direct, dial-in (modem),
or Ethernet connection

Controller components

The controller consists of a termination module, main module, and display module (Figure 4).

Figure 4. **Tracker controller components**

Termination module

Main module

Display module
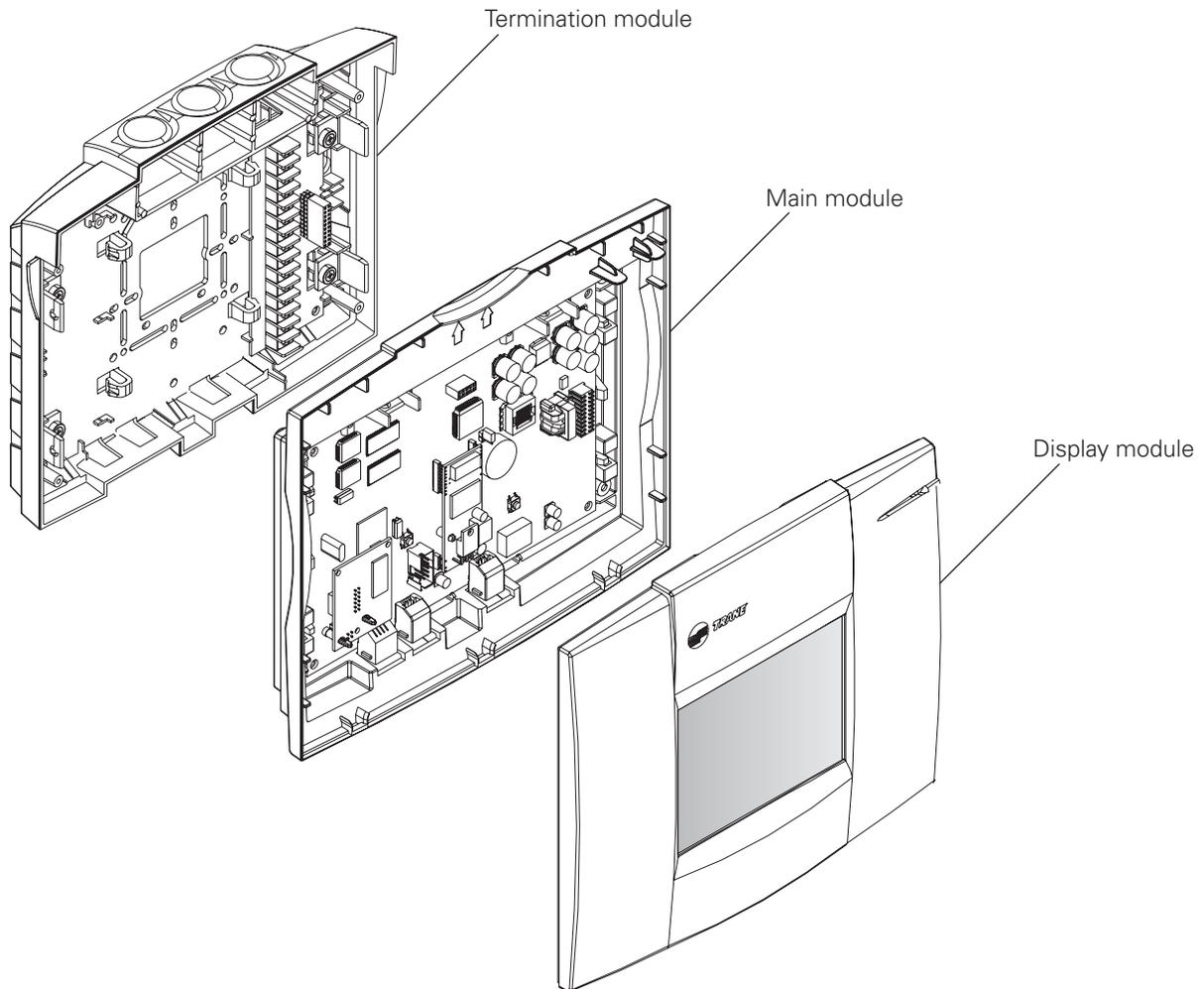
Termination module

The termination module (Figure 5) is a housing that provides a termination board and cable access for power, communications, and system input connections. Mounting holes enable it to be mounted on a wall or a recessed conduit box. The termination board accepts connections for power, communications, and system inputs.

Figure 5. Termination module

Termination board

Cable access (three places)
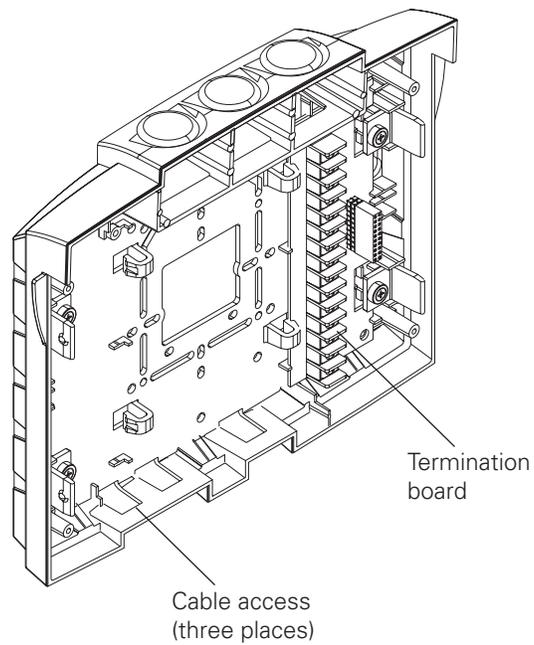
Main module

The main module (Figure 6) is a housing that contains the main logic board and the Ethernet board. The main module can be "hot swapped": it can be removed and installed without removing power from the termination module. When the main module is installed onto a powered termination module, it receives power and begins to operate automatically.

The main logic board provides an Ethernet LAN port, a PC interface port, and a modem port. It provides an internal interface to termination module I/O. It also provides Comm5 communication, 24 VAC power, alarm, and communication indicators. It communicates and exchanges data with the devices wired to the termination module. It also communicates with the display module.

The Ethernet board provides two LED indicators. One shows that an Ethernet link is detected; the other shows that there is serial traffic between the Ethernet board and the main logic board.

Figure 6. Main module
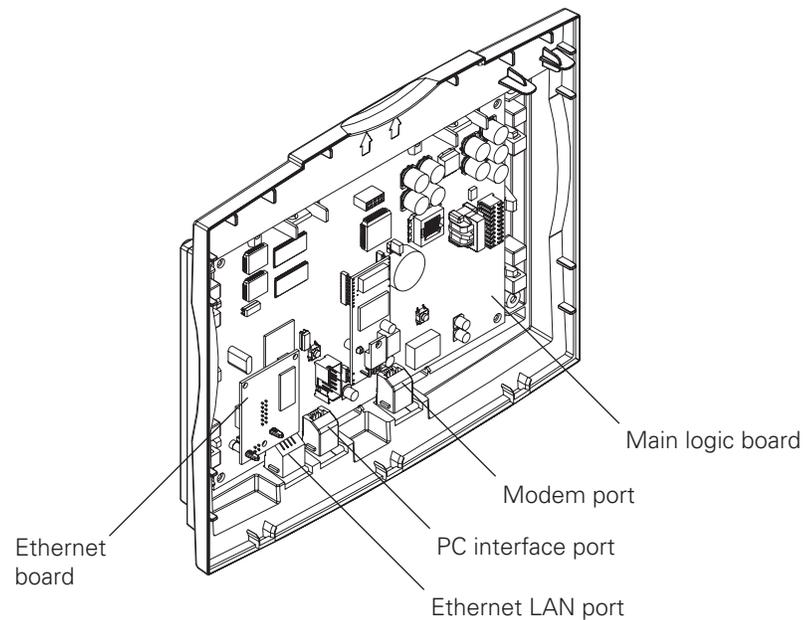
Display module

The display module (Figure 7) is a housing that contains a printed circuit board, liquid crystal display (LCD) touch screen, and an alarm LED. The printed circuit board supports the LCD touch screen and the alarm LED. The touch screen provides the operator access to the user interface program.

The display module can be "hot swapped:" it can be removed and installed without removing power from the main module. When the display module is installed onto a powered main module, it receives power and begins to operate automatically.

Figure 7. Display module

Alarm LED

LCD touch screen
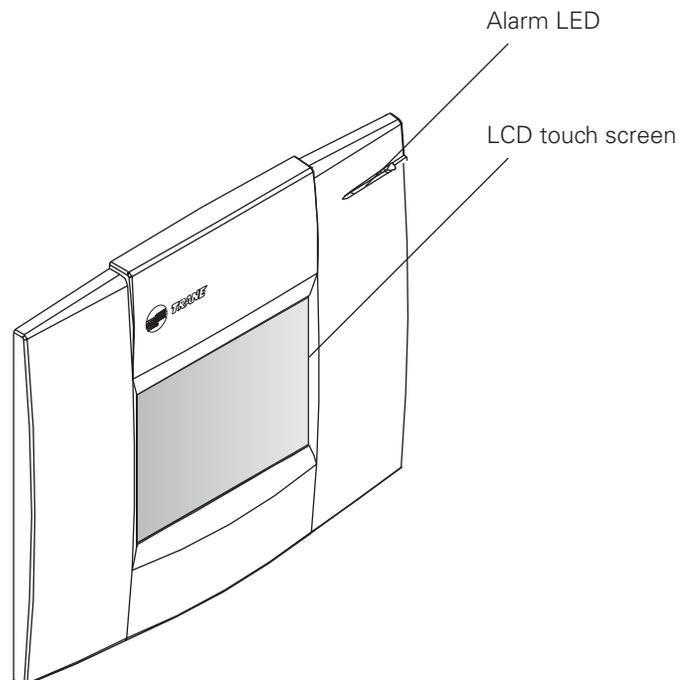
Model numbers

Each controller is identified by a model number that provides information about the controller (Figure 8).

Figure 8. Model number definition

Digit number	1	2	3	4	5	6	7	8	9	10	11	12	13	14
Model number	B	M	T	K	0	0	0	A	A	0	A	x	1	0

Digit	Description
1–2	BM = Building management
3–4	TK = Tracker
5–7	Customer ID: 000 = Customer sales office (CSO) KBB = Independent wholesale distributor (IWD)
8	A = 24 Vac, 50/60 Hz
9	Ethernet option A = Modem with no Ethernet LAN option B = Modem with Ethernet LAN option
10–11	0A = Design sequence
12	Model/software options: 1 = Model 12 2 = Model 24 3 = N/A 4 = N/A 5 = WSHP (water-source heat pump) 6 = N/A
13	Display options: 1 = LCD touch screen
14	Language options: 0 = English

Tracker controller specifications

Table 1 shows the specifications for the Tracker controller.

Table 1. Tracker Controller specifications

Specification	Description
Power	24 Vac nominal (19 Vac to 30 Vac), 50/60 Hz, 1 phase 40 VA minimum, UL Class 2 transformer required
Operating environment	From 32°F to 122°F (0°C to 50°C) 10% to 90% relative humidity, non-condensing
Storage environment	From –40°F to 185°F (–40°C to 85°C) 5% to 95% relative humidity, non-condensing
Cabinet	NEMA 1 resin enclosure—plenum rated
Mounting	Flat wall surface with one of the following recessed conduit boxes: 2 in. × 4 in. (5.08 cm × 10.15 cm) 4 in. × 4 in. (10.15 cm × 10.15 cm)
Dimensions	Height: 8.75 in. (22.38 cm) Width: 10.25 in. (26.04 cm) Depth: 2.75 in. (6.99 cm)
Weight	2.5 lb (1.13 kg)
Analog input • Thermistor	10 kΩ at 77°F (25°C) From –50°F to 200°F (–46°C to 93°C)
Binary inputs • Utility pulse meter • Priority shutdown	User-supplied dry contacts only. Tracker-supplied voltage of 12 Vdc nominal (10 Vdc to 14 Vdc) at 12 mA nominal (10 mA to 14 mA).
Binary output • Alarm relay	Tracker-supplied single-pole single-throw (SPST) dry contact rated at 24 Vac, 0.5 A maximum
Memory backup	At power loss, the system backs up memory and stores all data for seven days. After seven days, trends and alarms are not retained.
Approvals	See Appendix B, Declaration of Conformity.

UCM maximum capacities for Tracker models 12 and 24

The Tracker model 12 and 24 controllers can control and monitor specific types and numbers of Trane unit control modules (UCMs) as specified in this topic. The supported UCMs are as follows:

- HVAC controllers that conform to the LonMark® Space Comfort Controller (SCC) profile: the primary controller options are the Voyager rooftop with a Tracer LCI-V, Precedent rooftop with ReliaTel controls and a Tracer LCI-R, and Tracer ZN517 unitary controller. Other controllers are limited to the Tracer ZN510, ZN511, and ZN524.
- VariTrac central control panels (CCPs) with a TCI-V.
- Tracer MP503 I/O module.

Table 2 shows the maximum number of each UCM type that can be linked to each Tracker controller model. Any combination of the specified UCMs may be used in aggregate if they do not exceed the maximum. (For example: A fully loaded Tracker 24 controller can control 24 SCC devices, 10 VariTrac CCPs, and 4 Tracer MP503 I/O modules.)

The Trane VariTrac CCP is the main controller for either a changeover bypass system configuration or a delivered variable air volume (VAV) system configuration. Any combination of CCP configurations may be used in aggregate, as long as they do not exceed the maximum.

Note:
- Each VariTrac CCP configured for changeover bypass can control 1 HVAC device and up to 24 VAV UCMs.
- Each VariTrac CCP configured for delivered VAV can control 1 HVAC device and up to 32 VAV UCMs.
- See repeater information, "Requirements for repeaters on Comm5 communication links" on page 37.

Table 2. Tracker controller models 12 and 24 UCM capacities

Tracker model	UCM type	Maximum UCMs
24	SCC*	24
	Trane VariTrac CCP	10
	Tracer MP503 I/O module	4
	Total maximum UCMs supported	**38**
12	SCC*	12
	Trane VariTrac CCP	5
	Tracer MP503 I/O module	4
	Total maximum UCMs supported	**21**
* SCCS supported by Tracker are limited to Voyager rooftops, Precedent rooftops with ReliaTel controls, Tracer ZN517, ZN510, ZN511, and ZN524.		

UCM maximum capacities for Tracker model WSHP

The Tracker model WSHP controller can control and monitor specific types and numbers of Trane unit control modules (UCMs) as specified in this topic. The supported UCMs are as follows:

- Space Comfort Controllers (SCCs): the primary controller options are the Tracer ZN510, ZN511, and ZN524. Other controllers are limited to Voyager rooftops with a Tracer LCI-V, Precedent rooftops with ReliaTel controls and a Tracer LCI-R, and Tracer ZN517 unitary controllers
- Tracer loop controller (TLC)
- Tracer MP503 I/O module

Table 3 shows the maximum number of each UCM type that can be linked to each Tracker controller model. Any combination of the specified UCMs may be used in aggregate if they do not exceed the maximum. (For example: As the table shows, a fully loaded Tracker WSHP controller can control 100 SCC devices, 1 Tracer loop controller (TLC), and 4 Tracer MP503 I/O modules.)

> **Note:**
> See repeater information, "Requirements for repeaters on Comm5 communication links" on page 37.

Table 3. Tracker controller model WSHP UCM capacities

Tracker model	UCM type	Maximum UCMs
WSHP	SCC*	100
	TLC**	1
	Tracer MP503 I/O module	4
	Total maximum UCMs supported	**105**
* SCCS supported by Tracker are limited to Tracer ZN510, ZN511,and ZN524; Voyager rooftops; Precedent rooftops with ReliaTel controls; and Tracer ZN517. ** The TLC is mandatory and must be present to enable SCC compressor operation.		

IMPORTANT
SCC compressor operation will be enabled only when a TLC is communicating with the Tracker panel.

Before installation

Before beginning to install the Tracker controller, make sure that you have all the necessary controller components and that they are undamaged. Also, take steps to protect components until they are needed.

IMPORTANT
Before you install the Tracker hardware, review this guide and other Tracker support literature and create an installation plan.

Verify the shipment

When the shipment arrives at the job site, carefully unpack the carton. Even though outgoing orders are thoroughly reviewed before leaving the factory, compare the items in the shipment with the shipping authorization paper and verify that all items are present.

Verify that the controller model received is the model that you ordered and write down the model number for use later.

> **Note:**
> Contact your sales office to order additional Tracker literature, if needed.

Inspect for shipping damage

Inspect the items in the shipment to verify that no shipping damage or loss occurred. If your inspection reveals damage or material shortage:

- Make the appropriate notation on the carrier delivery receipt.
- Immediately file a claim with the carrier, specifying the extent and type of damage and/or shortage found.
- Notify the appropriate Trane representative.

Store unused components until needed

CAUTION

Avoid Equipment Damage!

Store all Tracker components off-site until most or all of the building construction is complete. Failure to do so could result in damage to components.

The termination module is shipped detached from the main module and display module assembly. To protect the controller from damage, Trane recommends storing the main module and display module assembly away from the construction and/or installation site to prevent it from being damaged or lost. Verify that the storage site conforms to the specifications shown in Table 1 on page 9.

After installation

After installing the Tracker hardware, use the post-installation checklist (Table 4) to verify that all installation procedures were completed.

Table 4. Tracker controller post-installation checklist

Inspect shipment upon receipt

_____ Verify that the shipment is complete.

_____ Inspect the controller and accessories to verify that there has been no shipping damage or loss.

_____ File a damage claim with the carrier, if necessary.

_____ Verify that the controller received is the one that was ordered.

_____ Write down the controller model number for use later.

Verify termination module mounting

_____ Verify that the controller is in a safe indoor environment.

_____ Verify that the location enables appropriate personnel to access the controller.

_____ Verify that the controller is mounted securely with recommended fasteners and screws.

_____ Verify that the installation conforms to controller dimensions, recommended clearances, and viewing angles.

Verify 24 Vac power wiring

_____ Verify that the power wiring complies with applicable codes.

_____ Verify the 24 Vac power connection to the controller termination Block TB1.

_____ Check the power wiring for shorts and improper grounds.

_____ If using conduit connections, make sure separate conduits are used for power and communications.

_____ Inspect the controller printed circuit card for damage.

Verify input and output wiring

_____ Verify that wiring complies with specifications.

_____ Inspect all binary and analog terminations at TB1.

Verify communication wiring

_____ Verify that wiring complies with specifications.

_____ Inspect communication wiring between devices.

_____ Verify that all connections are properly shielded.

Verify wire terminations with a voltmeter

_____ Verify that the tests detailed in Table 18 on page 70 provide acceptable values.

Verify main module installation

_____ Verify that the main module is snapped in tightly against the termination module.

_____ Verify that there is LED5 (HRT) activity.

Verify display module installation

_____ Verify that the display module is snapped in tightly against the main module.

_____ Verify that the touch screen illuminates when touched.

Verify direct and modem communication wiring

_____ Verify that the recommended cable is used for a direct PC connection.

_____ Verify that the recommended adapter is used for the direct connection cable.

_____ Verify that the direct connection cable is connected to the correct Tracker port.

_____ Verify that the phone cable is connected to the correct Tracker port.

Verify Ethernet communication wiring

_____ Verify that the recommended cable is used for the connection.

_____ Verify that the Ethernet connection cable is connected to the correct Tracker port.

FCC compliance

The Tracker controller generates, uses, and radiates radio frequency energy and if not installed and used in accordance with the instruction manual, may cause interference to radio and television reception. The Tracker controller has been tested and found to comply with the limits for a Class A computing device in accordance with the specifications in Subpart J of Part 15 of FCC rules, which are designed to provide reasonable protection against such interference in a commercial installation.

There is no guarantee that interference will not occur in a particular installation. If the Tracker controller does cause interference, consult a radio or television technician for suggestions to correct the problem. Also, the booklet *How to Identify and Resolve Radio-TV Interference Problems* is available from the U.S. Government Printing Office, Washington DC 20402. Order stock number 004-000-00345-4.

Chapter 2

Termination module mounting

After unpacking and inspecting the shipment, mount the termination module. The mounting process for the termination module consists of selecting a location and mounting the module. This chapter provides information and procedures that enable you to mount the termination module.

Select a location for the controller

When selecting a location for the Tracker controller:

- Select a location that is in a clean, non-corrosive, indoor environment. The controller is only intended for indoor installation.
- Consider both security and control wire lengths when making the selection.
- Select a location that limits controller access to operating and service personnel.
- Select a location that conforms to the operating environment described in Table 1 on page 9. The recommended operating environment will extend the life of the electronic components. Verify that the location does not subject the controller to extreme operating conditions (including excessive vibration).

CAUTION
Avoid Equipment Damage!
Install the Tracker controller out of direct sunlight. Failure to do so may cause overheating, which could result in equipment damage.

IMPORTANT
Do not install the Tracker controller near high-power radio signals, electrical switching gear, power buses, large motors, or other sources of electrical noise. The electrical interference may lead to control malfunctions.

Verify location conformance to controller specifications

Verify that the selected location conforms to the applicable controller specifications listed in Table 1 on page 9.

Verify location conformance to controller dimensions and clearances

Verify that the selected location provides enough space to accommodate the controller (Figure 9) and its minimum clearances (Figure 10 on page 17):

- The top clearance allows for ventilation and conduit entry.
- The bottom clearance allows for PC cable interface clearance.
- The front clearance allows for operation and service access.
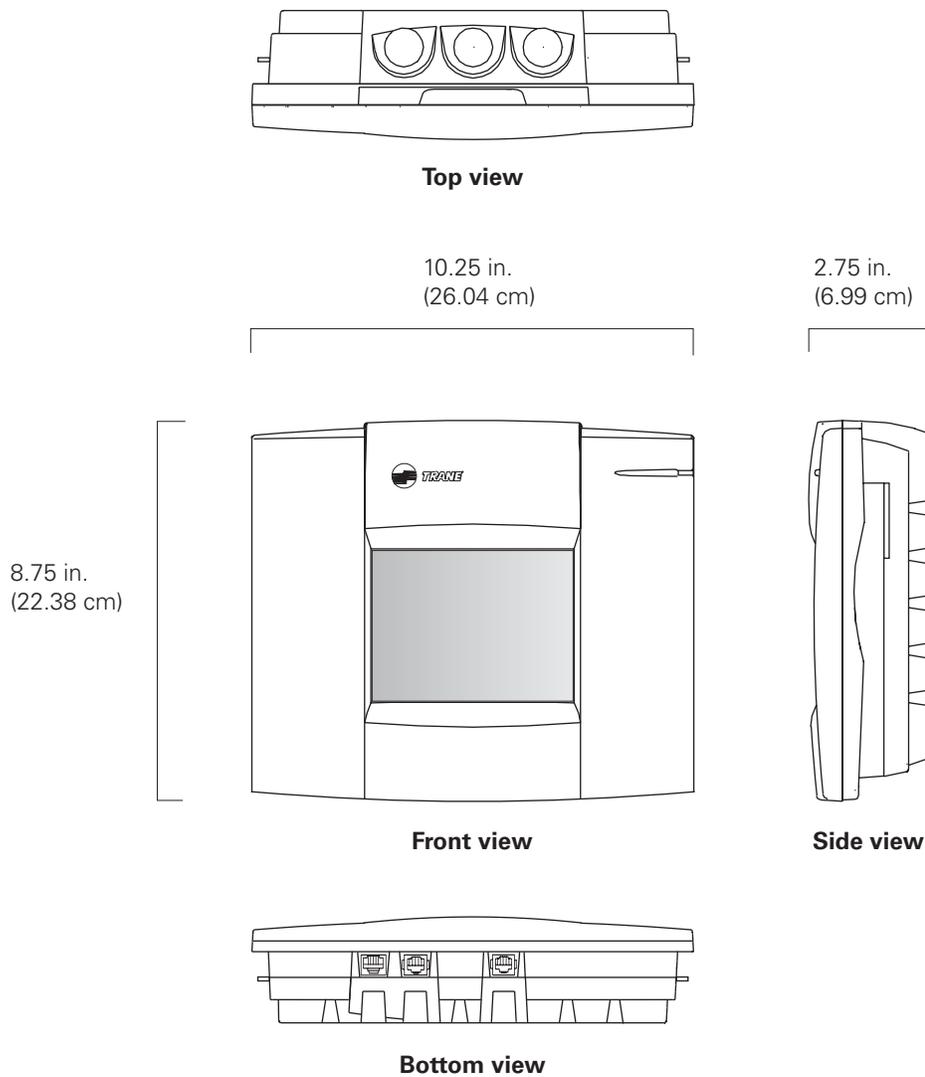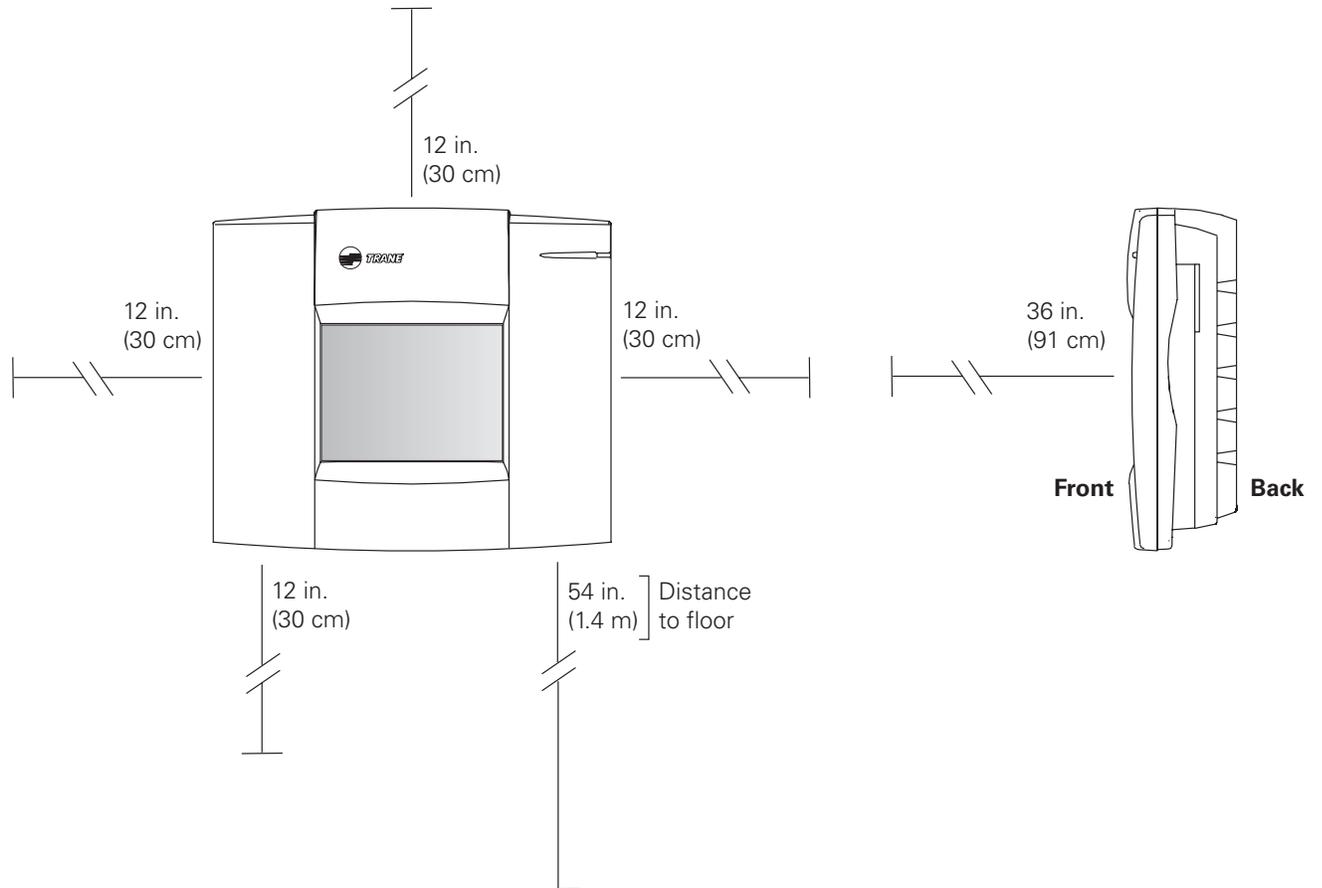
Figure 9. Dimensions

Top view

10.25 in.
(26.04 cm)

2.75 in.
(6.99 cm)

8.75 in.
(22.38 cm)

Front view   Side view

Bottom view

Figure 10. Minimum clearances

Verify location conformance to optimal touch screen viewing angles

Verify that the height and location enable the user to view the touch screen at the optimal viewing angles (Figure 11).

Figure 11. Optimal touch screen viewing angles
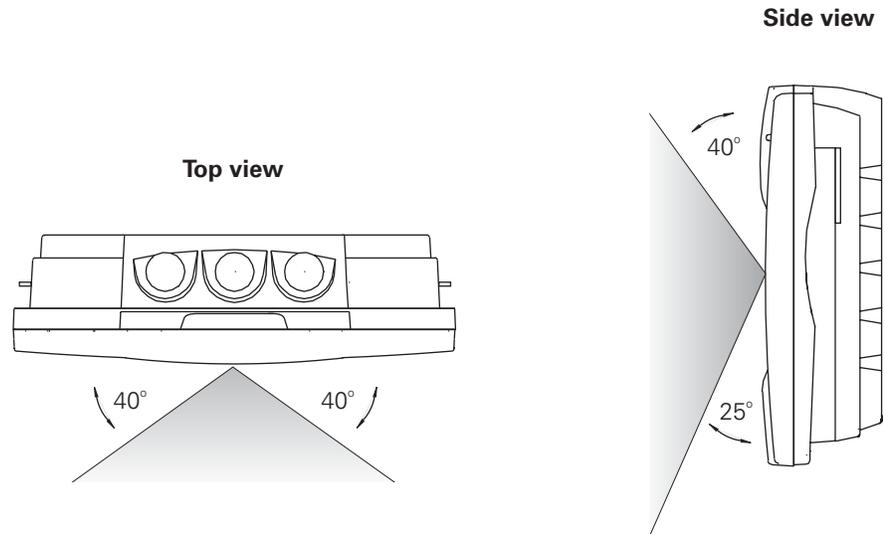
Mount the termination module

After selecting a suitable location for the Tracker controller, mount the termination module. Mounting consists of securing the termination module to a wall or a 2 in. × 4 in. recessed conduit box (mounted vertically or horizontally) or a 4 in. × 4 in. recessed conduit box (several European electrical box sizes are also usable) and installing electrical conduit (optional). Figure 12 shows the conduit access and mounting holes on the termination module.

Figure 12. Termination module conduit access and mounting holes
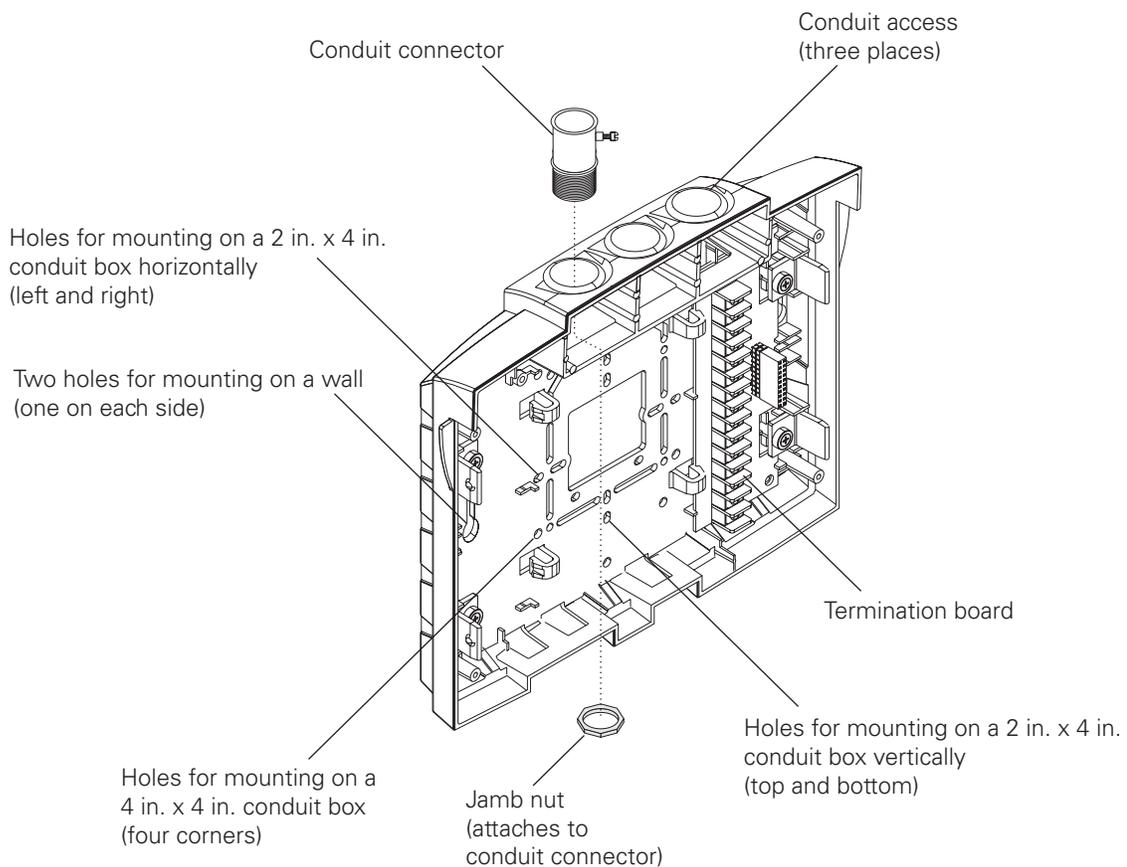
Securing the termination module to a wall

1. Mark the location of the two mounting holes on the wall.

2. Set the termination module aside and drill mounting holes.

3. Secure the termination module to the wall with the supplied hardware (#10 × 1 in. screw with plastic anchor).

Securing the termination module to a conduit box

1. Remove the screws from the conduit box.

2. Line up the conduit box screw holes on the termination module (Figure 12 on page 19) with the screw holes on the conduit box.

3. Install the screws.

> **Note:**
> When mounting the termination module to a 4 in. × 4 in. conduit box, removing the plastic cover over the box will provide easier access. Do not attempt to break away excess plastic. Instead, use a hack saw blade and carefully cut away the plastic.

Installing electrical conduit

Use the conduit openings on the top of the Tracker termination module to supply power or communication wires to the controller.

If the controller is mounted on a wall, you must use electrical conduit. If the controller is mounted to a conduit box through which power, input/ output, and communications are supplied, you do not need to use electrical conduit.

IMPORTANT
The 24 Vac wire conduit may not contain input/output or communication wires. Failure to comply will cause the Tracker controller to malfunction due to electrical noise.

1. Remove one of the $^7/_8$ in. (22 mm) diameter plugs at the top of the termination module (Figure 13).

2. Install $^1/_2$ in. (12 mm) conduit connector (Figure 12 on page 19) in opening.

3. Install the conduit jamb nut on the conduit connector threads and tighten it to secure the connector to the Tracker panel.

Figure 13. Electrical conduit installation
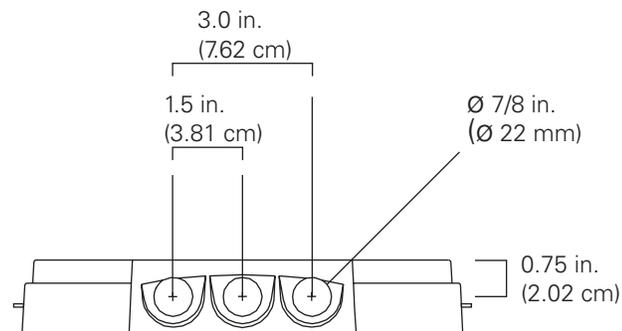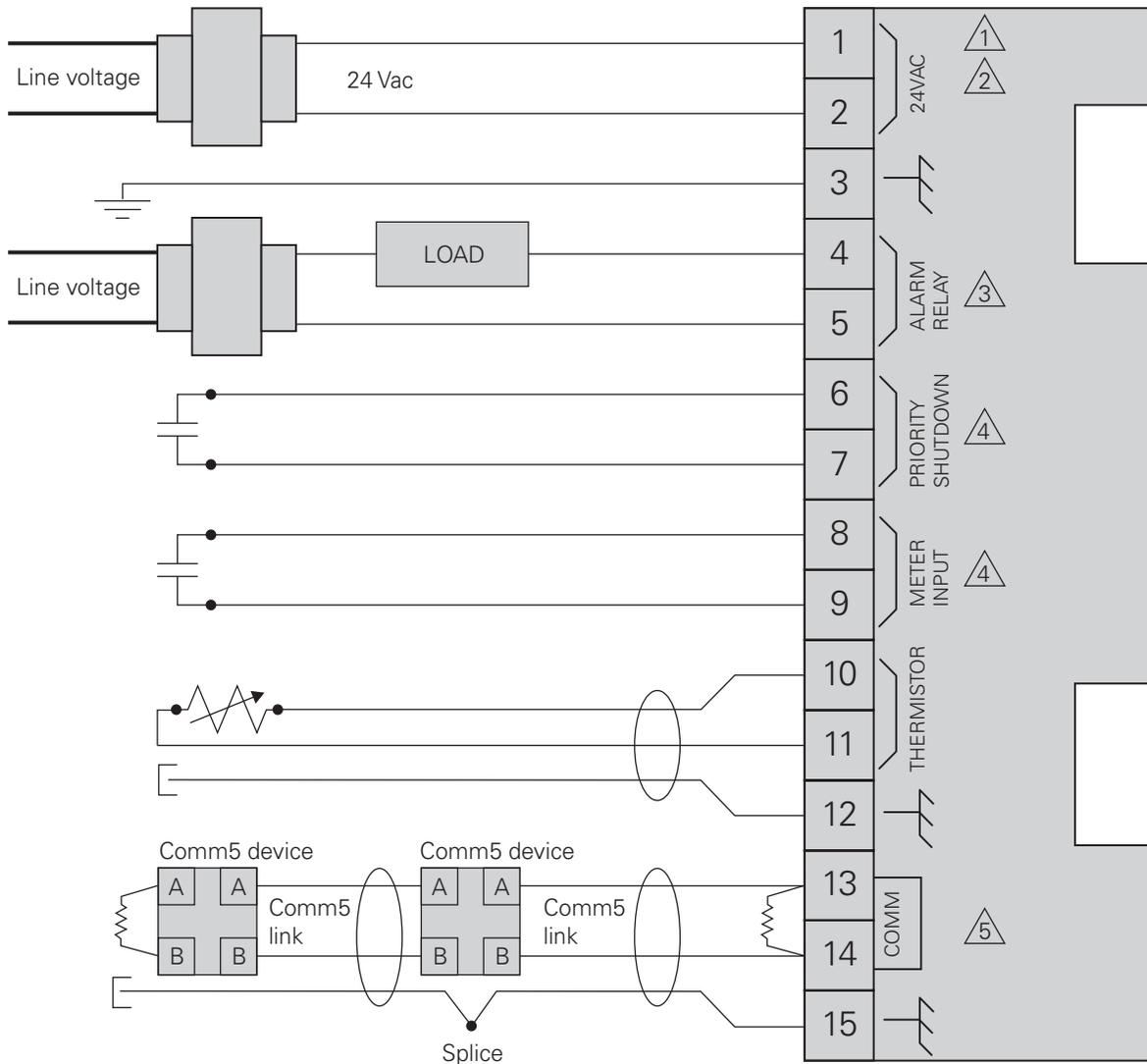

Termination module top view

Chapter 3

Termination board wiring

After mounting the termination module, wire the termination board. The wiring process consists of wiring the termination board to 24 Vac power, inputs, outputs, and UCMs. This chapter provides information and procedures that enable you to wire the termination board. Figure 14 on page 24 shows all field wiring connections.

Refer to the required and optional supply checklists in Appendix A (Table 15 and Table 16 on page 65) to verify that you have the materials required to wire the Tracker controller. When termination board wiring is complete, use the termination module post-installation checklist in Appendix A (Table 18 on page 70) to verify the wiring.

Figure 14. Tracker field wiring connections

1	24VAC ⚠1 ⚠2
2	
3	
4	ALARM RELAY ⚠3
5	
6	PRIORITY SHUTDOWN ⚠4
7	
8	METER INPUT ⚠4
9	
10	THERMISTOR
11	
12	
13	COMM ⚠5
14	
15	

Legend

⬛ = Transformer

⟋⟍ = Thermistor device per Trane specifications

⌇ = Termination resistor

⬭ = Twisted pair, shielded wire per Trane specifications

⊏ = Shield termination

╪ = Contact points

⏚ = Earth ground

⊣ = Shield ground

△ = Figure note

Figure Notes:
1 All customer wiring must be in accordance with national, state, and local electrical codes.
2 Trane recommends a dedicated transformer for 24 Vac power.
3 Alarm relay circuit must not exceed 24 Vac, 1 A.
4 Do not apply voltage to the priority shutdown inputs.
5 Example of Comm5 communication link wiring. See product-specific literature for Comm5 wire connection details.

Wire 24 Vac power

After the termination module is mounted in the selected location, wire 24 Vac power to the termination board. Table 5 shows the specifications for power wiring.

Table 5. Power wiring specifications

24 Vac power terminals	Description	Wire specifications
24 Vac TB1-1, TB1-2, Earth ground TB1-3	Power input 24 Vac nominal (19–30 Vac), 50/60 Hz, 1 phase 40 VA minimum, class 2 transformer required	Trane recommends 18 AWG (1.02 mm^2) wire and metal conduit. Low voltage (24 Vac) wire must comply with National Electrical Code (NEC) and federal, state, and local electrical codes.

IMPORTANT
The 24 Vac wire conduit may not contain input/output or communication wires. Failure to comply may cause the Tracker controller to malfunction due to electrical noise.

1. Route input wires into the termination module through the conduit box or any of the conduit access openings designated for input and communication wiring (Figure 12 on page 19).

2. Wire the two 24 Vac power input wires and the ground wire to the controller 24 VAC terminals (Figure 14 on page 24).

Wire optional inputs and outputs

The Tracker controller provides input and output terminals as follows:

- Input for an optional priority shutdown device
- Input for an optional utility pulse meter
- Input for an optional outdoor air temperature sensor
- Output terminal for an optional alarm relay

Refer to Table 6 for input and output wire specifications, and to the termination board wiring diagram in Figure 14 on page 24 for wiring all inputs and outputs.

Table 6. Input and output wire specifications

Input and output terminals	Description	Wire specifications
Alarm relay output TB1-4, TB1-5	Binary output Dry contact Operating range: 24 V, 1 A maximum	Trane recommends 18 AWG (1.02 mm^2) wire and metal conduit. Maximum length = 1000 ft (305 m) *†
Priority shutdown device input TB1-6, TB1-7	Binary input Operating range: 12 Vdc nominal (10 Vdc to 14 Vdc) at 12 mA nominal (10 mA to 14 mA) < 50 Ω = switch closed > 1000 Ω = switch open	Trane recommends 18—22 AWG (1.02 mm^2—0.643mm^2) wire and metal conduit. Maximum length = 1000 ft (305 m) *‡
Utility pulse meter input TB1-8, TB1-9		
Thermistor input TB1-10, TB1-11, shield ground TB1-12	Analog input for an outdoor air temperature sensor Operating range: From –50°F to 200°F (–46°C to 93°C) Thermistor, 10 kΩ at 77°F (25°C)	Shielded wire, 18—22 AWG (1.02 mm^2—0.643mm^2) twisted pair Maximum length = 300 ft (91 m) *‡

* All field-installed binary wiring is low voltage and must comply with National Electrical Code (NEC) and federal, state, and local electrical codes.
† Alarm relay wires and 24 Vac wires may reside in the same conduit.
‡ Do not run input wires and ac power wires together in the same conduit or wire bundle.

Wire the alarm relay

Wire the alarm relay to the termination board output.

CAUTION

Avoid Equipment Damage!

Use a dedicated power transformer for this output. Failure to do so will damage the main module, if the alarm output is powered from the Tracker 24 Vac input (TB-1 and TB-2) and the circuit shorts to ground.

1. Route input wires into the termination module through a conduit opening (Figure 12 on page 19) or the conduit box.

2. Connect the wires to the ALARM RELAY terminals on the termination board (Figure 14 on page 24).

3. Connect the other end of the wires to the customer-supplied power supply and load.

Wire the priority shutdown device

Wire the priority shutdown device to the termination board input.

1. Route input wires into the termination module through a conduit opening (Figure 12 on page 19) or the conduit box.

2. Connect the wires to the PRIORITY SHUTDOWN terminals on the termination board (Figure 14 on page 24).

3. Connect the other end of the wires to the contacts of the priority shutdown device.

Wire the utility pulse meter

Wire the utility pulse meter to the termination board input.

1. Route input wires into the termination module through a conduit opening (Figure 12 on page 19) or the conduit box.

2. Connect the wires to the METER INPUT terminals on the termina-tion board (Figure 14 on page 24).

3. Connect the other end of the wires to the pulsed-output contacts of the electrical meter.

Wire the thermistor

The thermistor input is for a Trane outdoor air temperature sensor only. The input cannot be used for any other purpose. Using wire that meets the specifications listed in Table 6 on page 26, wire the thermistor to the termination board input.

1. Route input wires into the termination module through a conduit opening (Figure 12 on page 19) or the conduit box.

2. Connect the wires to the THERMISTOR terminals on the termination board (Figure 14 on page 24).

3. Connect the shield to the ground terminal.

> **Note:**
> The thermistor input is not polarity sensitive.

4. Connect the other end of the wires to the thermistor device.

IMPORTANT
Tape the shield at the sensor. Any connection between the shield and ground will cause a malfunction.

Wire the UCMs

The Comm5 communication link connects unit control modules (UCMs) to the Tracker termination module. Each controller has one Comm5 communication link. This topic includes information and procedures for wiring a UCM to a termination module:

> **Note:**
> Do not exceed the maximum number of UCMs that can communicate on a Tracker controller (see "UCM maximum capacities for Tracker models 12 and 24" on page 10 for details).

Wire specifications

Tracker Comm5 communication-link and sensor wiring is low-voltage Class 2 wire and must be field-supplied and installed in compliance with NEC and local codes. To prevent electrical noise interference, all wiring must comply with requirements outlined in this topic for wire selection and link-wiring topology.

Trane recommends that you use Level 4 (Echelon) shielded cable for the Tracker communication link wiring between the Tracker and the Comm5 UCMs to which it communicates. Trane also recommends that you use it for communication wiring between the VariTrac CCP and its associated VariTrac or VariTrane UCMs, and for sensor wiring to these devices.

Level 4 cable is available in shielded, plenum and non-plenum versions. Level 4 cable is available from Trane-approved suppliers as well as other suppliers. Table 7 on page 30 shows the Trane approved suppliers; Table 8 on page 31 provides the specifications for Level 4 compliant cables.

Table 7. Trane-approved wire suppliers

Supplier	Cable type	Number of pairs	Details	Catalog number
Connect-Air International Phone: 1-800-247-1978 FAX: 1-253-813-5699 Web: www.connect-air.com	Level 4 22 AWG (0.643mm^2)	1	Shielded plenum UL type CMP	W221P-2002
	Level 4 22 AWG (0.643mm^2)	1	Shielded non-plenum UL type CM	W221P-1003
Windy City Wire Phone: 1-800-379-1191 FAX: 1-708-493-1380 Web: www.smartwire.com	Level 4 22 AWG (0.643mm^2)	1	Shielded plenum UL type CMP	106500
	Level 4 22 AWG (0.643mm^2)	1	Shielded non-plenum UL type CM	107600
Category 4 cable is not the same as Level 4 cable and should not be used. The Echelon Level 4 cable specification was originally defined by the National Electrical Manufacturers Association (NEMA) and differs from the Category 4 specification proposed by the Electronic Industries Association/Telecommunications Industry Association (EIA/TIA).				

Table 8. Specifications for Echelon Level 4 compliant cables

Specification		Value
dc resistance (Maximum resistance of a single copper conductor regardless of whether or not it is solid or stranded and regardless of whether or not it is metal coated.)		18.0 Ω/1000 feet at 20°C
dc resistance unbalance (maximum)		5%
Mutual capacitance of a pair (maximum)		17 pF/foot
Pair-to-ground unbalance (maximum)		1000 pF/foot/1000 feet
Characteristic impedance	772 kHz	102 Ω ± 15%
	1.0 MHz	100 Ω ± 15%
	4.0 MHz	100 Ω ± 15%
	8.0 MHz	100 Ω ± 15%
	10.0 MHz	100 Ω ± 15%
	16.0 MHz	100 Ω ± 15%
	20.0 MHz	100 Ω ± 15%
Attenuation (maximum dB/1000 feet at 20°C)	772 kHz	4.5 dB/1000 feet at 20°C
	1.0 MHz	5.5 dB/1000 feet at 20°C
	4.0 MHz	11.0 dB/1000 feet at 20°C
	8.0 MHz	15.0 dB/1000 feet at 20°C
	10.0 MHz	17.0 dB/1000 feet at 20°C
	16.0 MHz	22.0 dB/1000 feet at 20°C
	20.0 MHz	24.0 dB/1000 feet at 20°C
Worst-pair near-end crosstalk (minimum) (Values shown are for information only. The minimum NEXT coupling loss for any pair combination at room temperature is to be greater than the value determined using the formula NEXT (F_{MHz})>NEXT(0.772)-15$_{log10}$ $(F_{MHz}/0.72)$ for all frequencies in the range of 0.772 MHz–20 MHz for a length of 1000 feet.)	772 kHz	58 dB
	1.0 MHz	56 dB
	4.0 MHz	47 dB
	8.0 MHz	42 dB
	10.0 MHz	41 dB
	16.0 MHz	38 dB
	20.0 MHz	36 dB
dc resistance unbalance (maximum)		5%

UCM wiring configurations

The Tracker UCM Comm5 communication-link wiring must be installed in a daisy-chain configuration (Figure 15 on page 32 and Figure 16 on page 33).

Figure 15. Daisy-chain configuration for UCM communication-link wiring (preferred configuration)
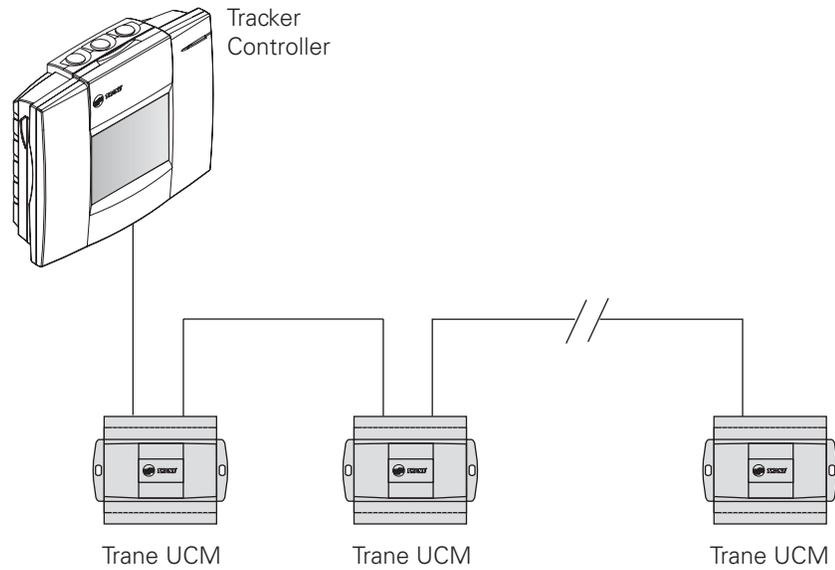

Figure Note:
Maximum wire length for daisy-chained wiring is 4593 ft (1400 m).

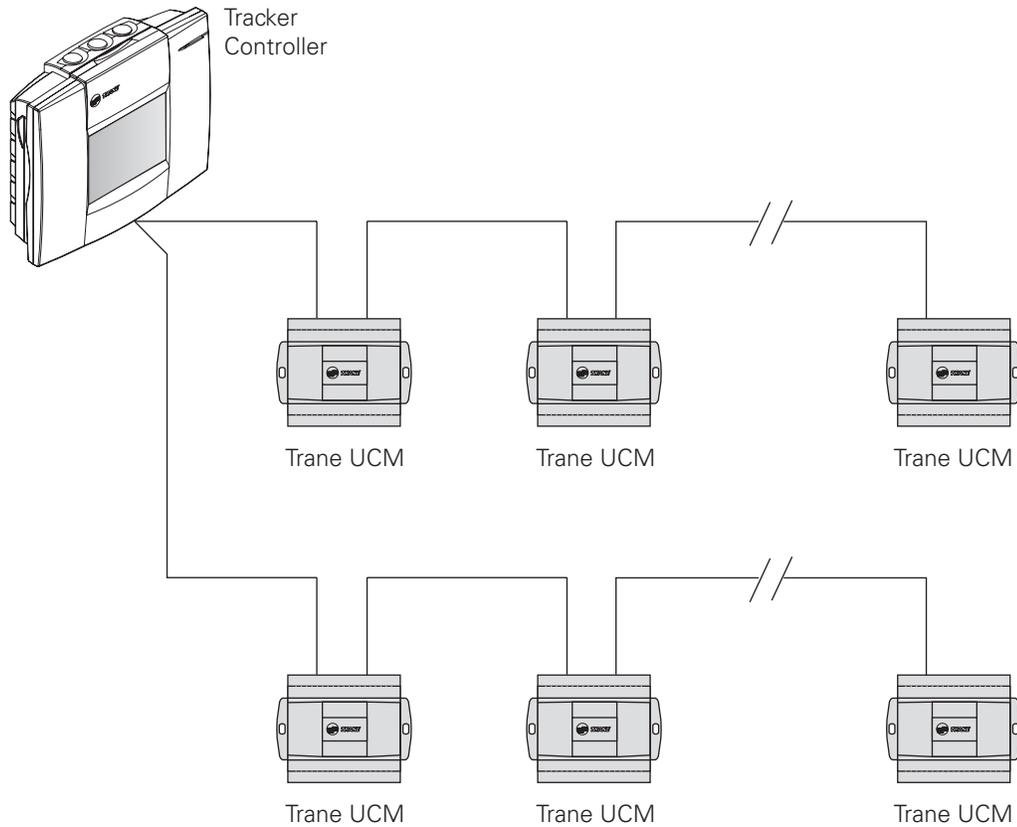**Figure 16. Daisy-chain configuration for UCM communication-link wiring with Tracker controller in middle of link**

Tracker Controller

Trane UCM   Trane UCM   Trane UCM

Trane UCM   Trane UCM   Trane UCM

Figure Note:
- Maximum wire length for daisy-chained wiring is 4593 ft (1400 m) unless a Comm5 repeater is used.

Termination resistor placement for Comm5 links

Install one 105 Ω resistor across the communication link terminals of the device at the beginning of the daisy chain, which is typically a Tracker controller. Then install a second 105 Ω resistor across the communication terminals at the last UCM on each link. See Figure 17 on page 35 for an example of a link that begins with a Tracker controller. See Figure 18 on page 36 for an example of a link that does not begin with a Tracker controller.

> **Note:**
> If, after installation, the link is extended to add more UCMs, the resistor must be relocated to the new last UCM on the link.

IMPORTANT

For maximum performance of the Comm5 link, use the 105 Ω resistors that are included with the Tracker controller. If they are not available, as a second choice, use a 100 Ω, ¼ W, 5% tolerance resistor, or as a third choice, a 110 Ω, ¼ W, 5% tolerance resistor. Failure to comply may cause the controller to malfunction.

The resistor value can be determined by reading its color bands. Table 9 provide the resistor color coding.

Table 9. Resistor color band table

Tolerance	Color sequence
105 Ω ± 1% tolerance	Brown, black, green, brown
100 Ω ± 5% tolerance	Brown, black, brown, gold
110 Ω ± 5% tolerance	Brown, brown, brown, gold

If a repeater is used, each link of the configuration that is created by the repeater requires termination resistors (see "Requirements for repeaters on Comm5 communication links" on page 37).

Create a set of as-built drawings or a map of the communication wire layout during installation. Ensure that sketches of the communication layout show the placement of the termination resistors.

Figure 17. Daisy-chain termination resistor placement
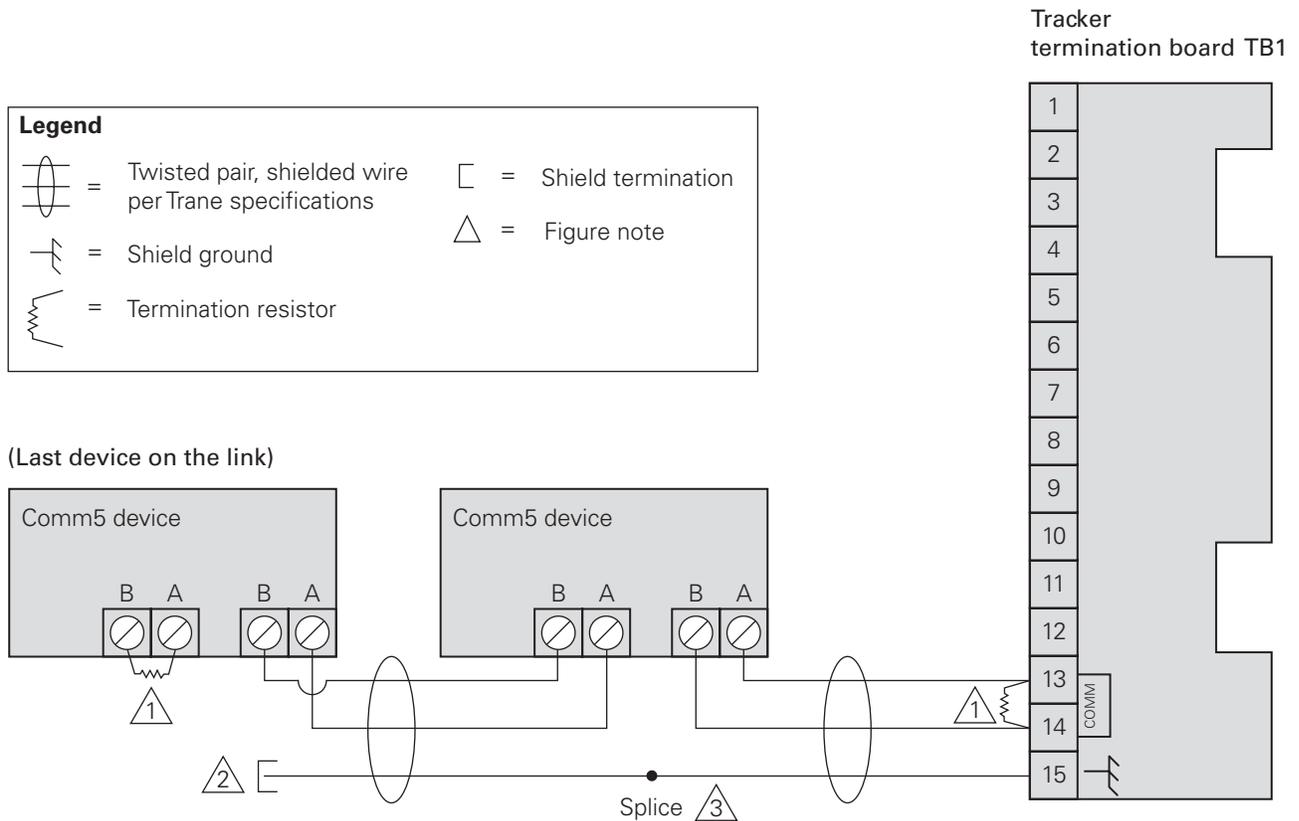
Legend

⬭ = Twisted pair, shielded wire per Trane specifications

⌐ = Shield termination

⊣ = Shield ground

△ = Figure note

⌇ = Termination resistor

Tracker termination board TB1
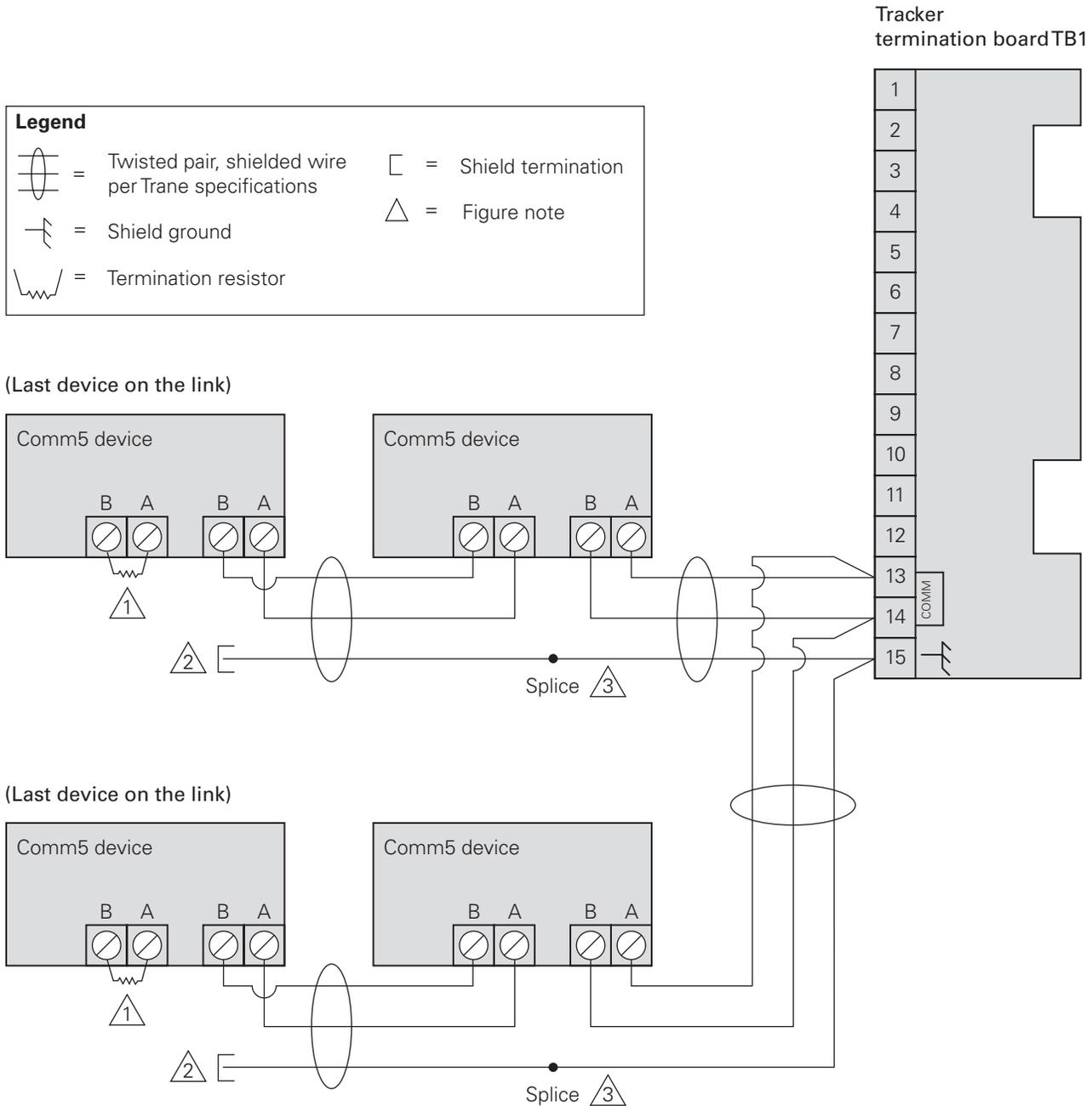
(Last device on the link)

Comm5 device

Comm5 device

Figure Notes:

1 105 Ω termination resistor

2 Shield must be cut back and taped at last unit controller.

3 A continuous shield is required. At each unit controller, splice shield wire and tape back to prevent grounding.

Figure 18. Termination resistor placement with a Tracker controller in the middle of the link

Figure Notes:
1 105 Ω termination resistor
2 Shield must be cut back and taped at last unit controller of each link.
3 A continuous shield is required. At each unit controller, splice shield wire and tape back to prevent grounding.

Wire supported UCMs

Wire the supported UCMs to the Tracker termination board. When installing communication wire:

- Keep the polarity consistent throughout the site. Although Comm5 is not polarity sensitive, consistency will improve serviceability.
- Strip away a maximum of 2 inches (50 mm) of the outer conductor and foil shield when splicing or terminating shielded wire.

IMPORTANT
Use extreme care when stripping away the outer conductor and foil shield. Be careful not to nick the insulating jacket of the two conductors. A nick in the insulating jacket will cause communication problems.

Wire the UCMs as follows:

1. Install termination resistors in the correct locations.
2. Route input wires into the termination module through the conduit box or any of the conduit openings designated for input and communication wiring (Figure 12 on page 19).
3. Connect the wires to the COMM terminals on the termination board (Figure 14 on page 24).
4. Connect the shield to the ground terminal.
5. Connect the other end of the wires to the UCMs, as necessary.

Requirements for repeaters on Comm5 communication links

The Comm5 communication link repeater is a device that repeats and regenerates the signal on a Comm5 link in order to enhance signal quality or extend the length of the run. The Comm5 link goes from the Tracker controller to the UCMs to the repeater. A second link segment extends from the other side of the repeater to the rest of the devices. The configuration on either side of the repeater must be a daisy-chain configuration. Both link segments require termination.

A link repeater is required when:

- The total wire length is greater than the maximum wire run length of 4593 ft (1400 m) for a daisy-chain configuration.
- More than 60 devices are connected to a link. This total does not include the Tracker controller, the link repeater, and the possible use of the Rover service tool on the same link.

The link repeater has several limitations:

- Only one link repeater can be used on a link.
- The use of a repeater doubles the maximum allowable wire length. For example, when a repeater is used with a daisy-chain configuration, the total wire length can be 9186 ft (2800 m) (with half the wire length on either side of the repeater).

- The link repeater is limited to 60 devices on either side of the link (120 devices total).
- The link repeater requires an earth ground. The installer should be aware of this before making power connections.

Recommended shield connections are shown in Figure 19. Figure 20 on page 39 shows a daisy-chain repeater connection. Follow these guidelines when using a repeater:

- Reference the installation information that comes with the link repeater (*Comm5 repeater installation*, 3270 3285).
- Connect the shield-drain wires entering the repeater to a terminal marked with a capacitor symbol. The entering shield-drain wire must be connected to earth ground at the Tracker controller.
- Connect the shield-drain wires leaving the repeater to the repeater terminal marked with an earth ground symbol.

Figure 19. Connecting communication link shield wiring to repeater
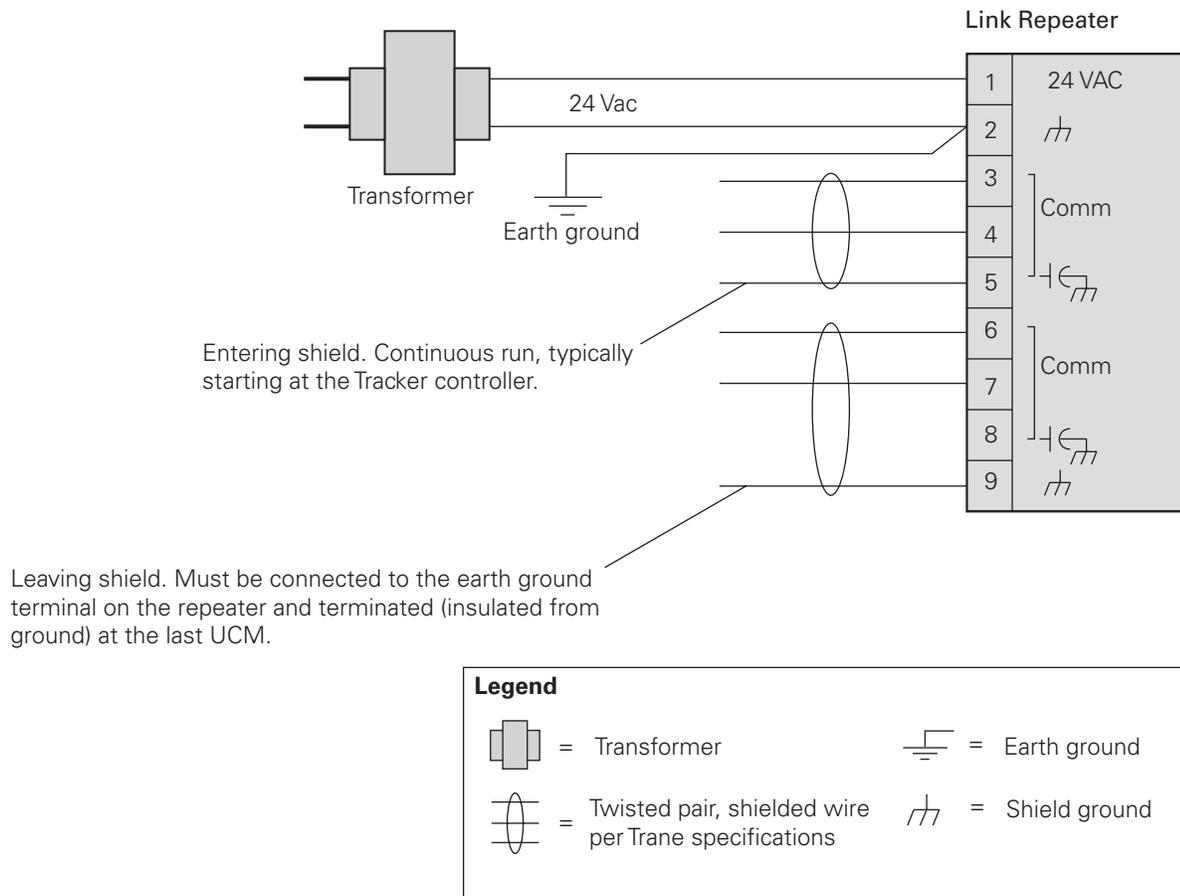
Figure 20. Comm5 daisy-chain repeater connection
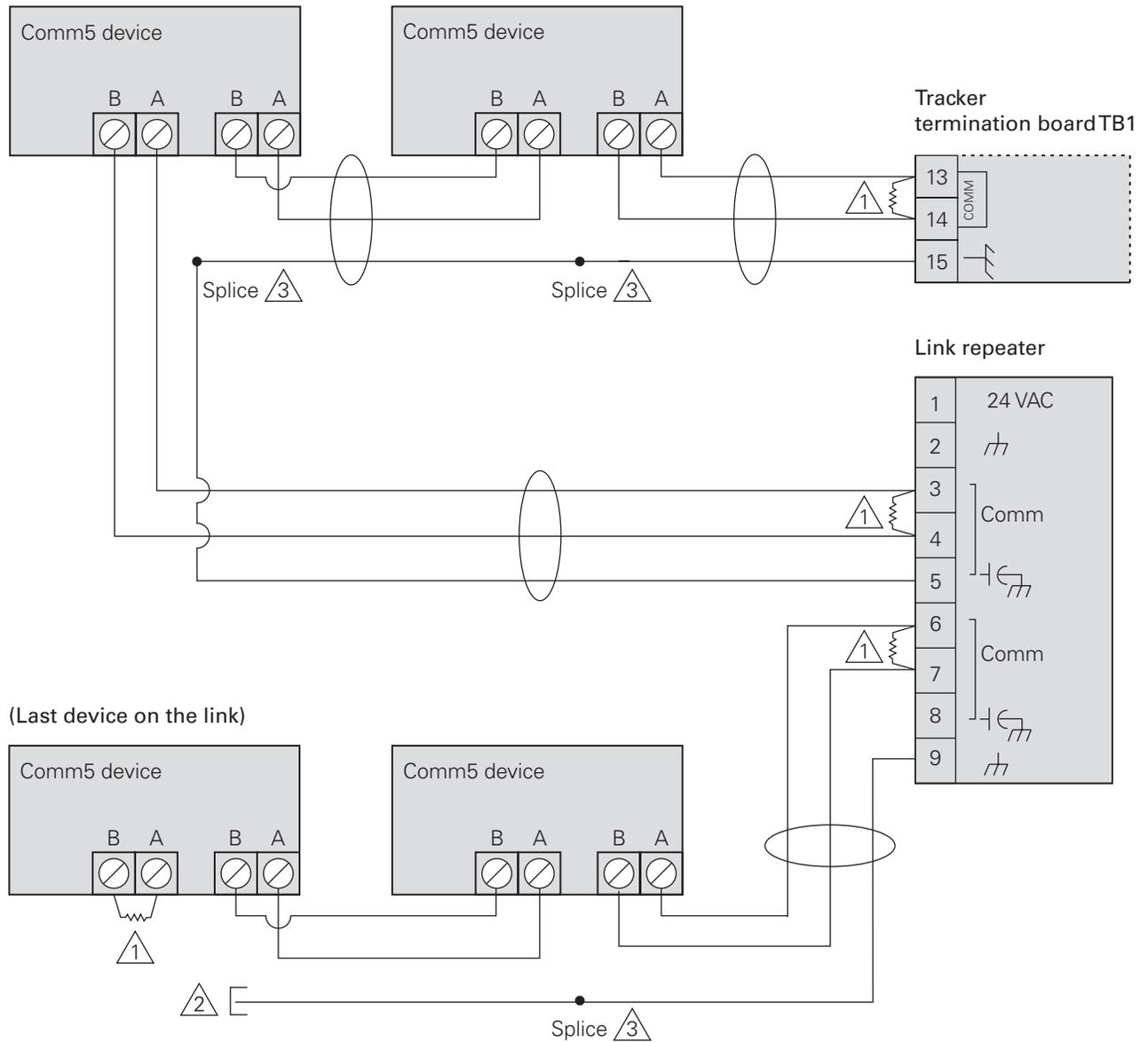
Legend

- ⬭ = Twisted pair, shielded wire per Trane specifications
- ⊣⊢ = Shield ground
- ⌇ = Termination resistor
- ⌐ = Shield termination
- △ = Figure note

Figure Notes:
1 105 Ω termination resistor
2 Shield must be cut back and taped
3 A continuous shield is required. At each controller, splice shield wire and tape back to prevent grounding.

Chapter 4

Main module mounting

After mounting and wiring the termination module, attach the main module to the termination module. This chapter provides information and procedures that enable you to mount the main module.

> **Note:**
> The Tracker controller ships with the display module assembled to the main module. If those two modules are assembled, performing this procedure also mounts the display module.

> **Note:**
> It is not necessary to turn off 24 Vac power to the Tracker controller prior to mounting or removing the main module.

1. Verify that all wires on the termination module are securely fastened in place.

2. Carefully line up the alignment pins on the termination module with the back side of the main module (Figure 21 on page 42).

CAUTION
Avoid Equipment Damage!

Do not use excessive force when mounting the module. If the module does not snap easily into place, slightly reposition it on the alignment pins. Failure to comply may cause damage to the module.

3. Firmly push the main module onto the termination module until it snaps into place. If 24 Vac power is applied, the main module will start. If the display module is not assembled to the main module, you will see the LEDs on the main module flash on and off after a few seconds. If the display module is assembled to the main module, it will turn on and display information.

Figure 21. Main module mounting

Termination module

Main module

Alignment pin
(four places)
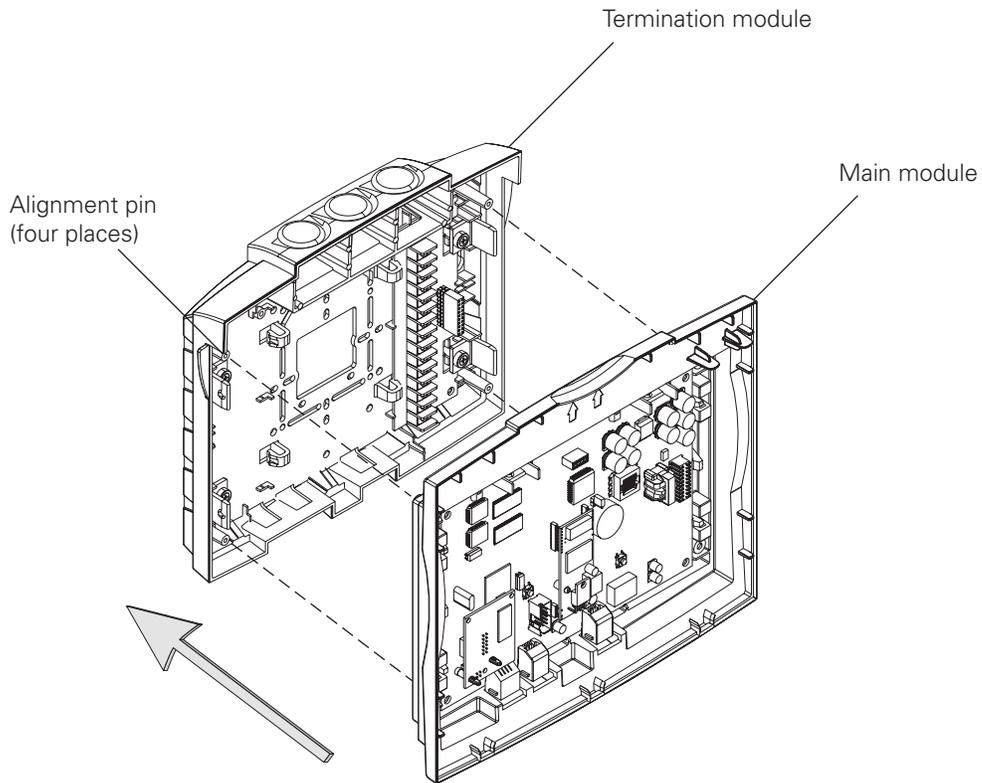
Chapter 5

Display module mounting

After mounting the main module, attach the display module to the main module. This chapter provides information and procedures that enable you to mount the display module.

> **Note:**
> The Tracker controller ships with the display module assembled to the main module. If those two modules are assembled, you need only to perform the main module mounting procedure (Chapter 4, "Main module mounting").

> **Note:**
> It is not necessary to turn off 24 Vac power to the Tracker controller prior to mounting or removing the display module.

1. Tilt the top of the display module about 30 degrees toward you.

2. Line up the three tabs on the bottom of the display module with the slots on the bottom of the main module (Figure 22 on page 44).

3. Starting with the center tab, insert the tabs into the slots.

CAUTION

Avoid Equipment Damage!

Do not use excessive force when mounting the module. If the module does not snap easily into place, slightly reposition it on the alignment pins. Failure to comply may cause damage to the module.

4. Push the top of the display module toward the main module until it snaps into place while making sure that the tabs on the display module engage the slots on the main module (Figure 23 on page 45). If 24 Vac power is applied to the Tracker controller, the display module will turn on and display information.

Figure 22. Tab and slot alignment

Main module

Display module

Slot
(three places)

Tab (three places,
not shown)

Figure 23. Display module engagement

Chapter 6

PC workstation wiring

The Tracker controller connects to a PC workstation with a direct connection cable, an internal modem, or an Ethernet connection.

Verify PC workstation specifications

Verify that the PC conforms to the minimum specifications listed on the insert in the CD jewel case and that the Tracker PC workstation software is installed.

Direct connection to PC workstation

To make an EIA-232 direct connection between the controller and a PC workstation, you need an RJ-12 cable and an adaptor matched to the serial port connector on the PC workstation (Table 10).

Table 10. **Cable and adapter specifications for direct connection**

Description	Trane part number
RJ-12 interface cable	3591 4260
9-pin female modular adapter	3591 4262
25-pin female modular adapter	3591 4263
The cable and adapter are not shipped with the Tracker controller and must be purchased separately.	

IMPORTANT
Do not use a standard phone cable for a direct connection. The RJ-12 cable is a 6-wire straight-through cable. Failure to comply will cause the Tracker controller to malfunction.

IMPORTANT
The maximum allowable length of the RJ-12 cable is 50 ft (15 m). Failure to comply may cause the Tracker controller to malfunction.

1. Locate the RJ-12 cable and the appropriate adapter.

2. Connect the RJ-12 cable to the RJ-12 port on the bottom side of the controller (Figure 24).

3. Connect the other end of the RJ-12 cable to a 9-pin or 25-pin adapter, as appropriate (Figure 25 on page 49).

4. Connect the adaptor to the appropriate serial port on the PC workstation.

Figure 24. Tracker communication ports

LAN RJ-45 port
(Ethernet connection)

RJ-12 port
(PC direct connection)

RJ-11 port
(modem connection to
standard telephone line)
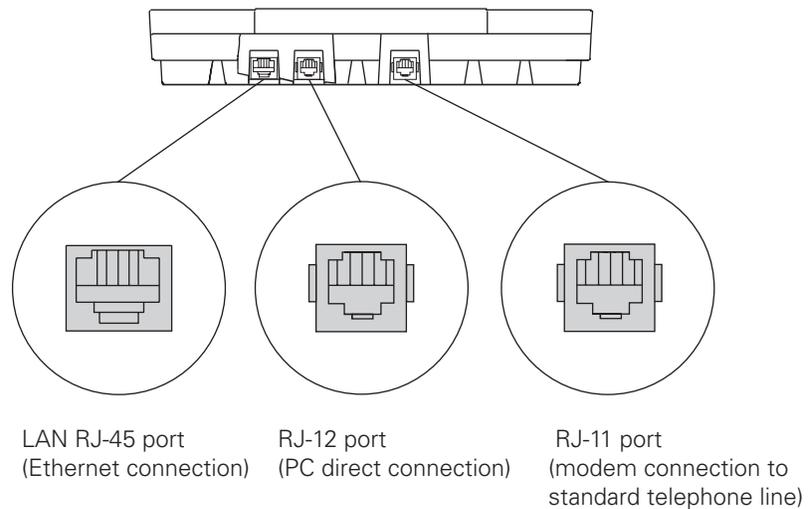
Figure 25. Tracker direct connection to a PC workstation

LAN RJ-45 port
for future Ethernet
connection
(bottom side)

RJ-12 port for PC
direct connection
(bottom side)

Connect RJ-12 to
9-pin female
adapter

To PC workstation
serial port

RJ-12 cable

Connect RJ-12 to
25-pin female
adapter
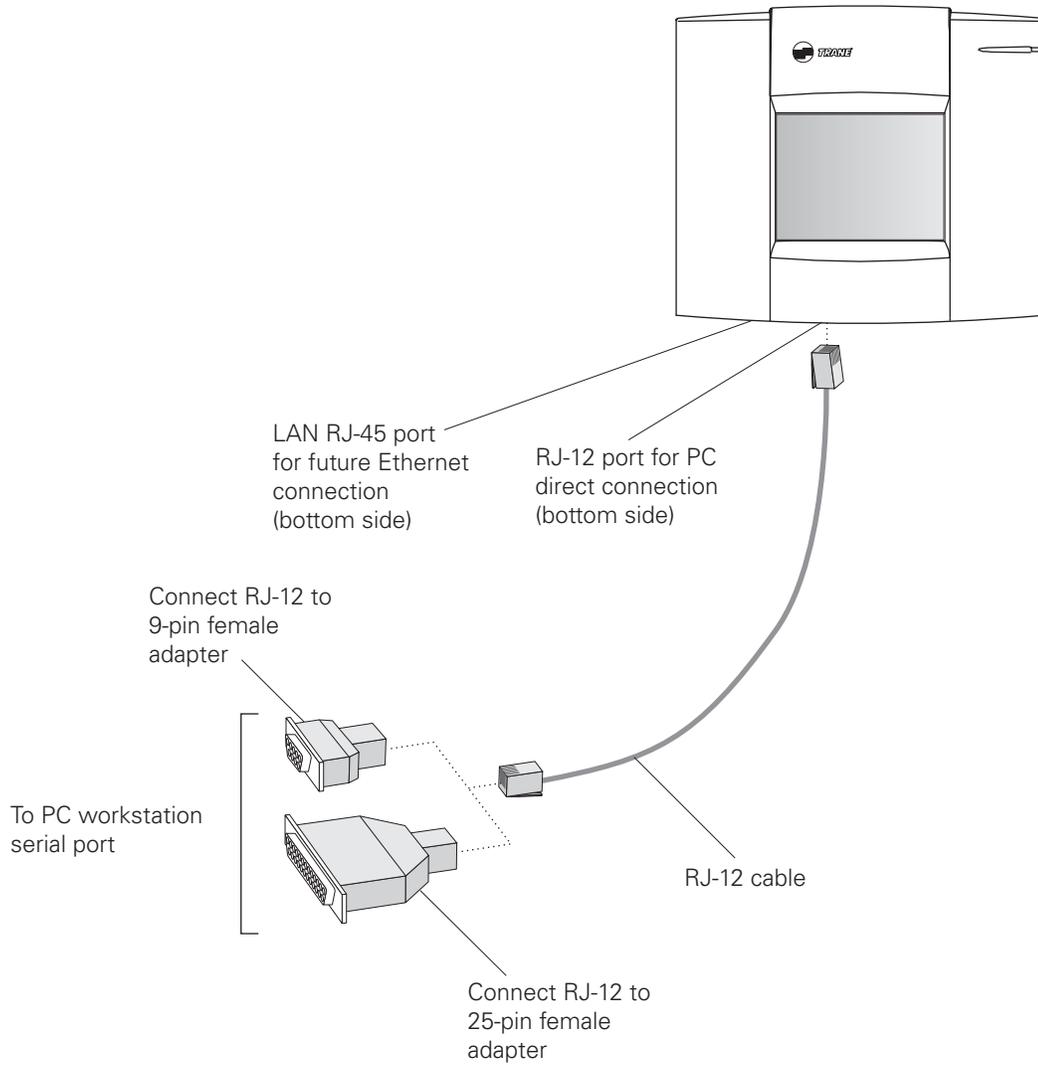
Modem connection to PC workstation

To make a modem connection between the controller and a PC workstation, you need an RJ-11 cable (standard telephone cable).

> **Note:**
> The Trane Company reserves the right to support only selected modems for the Tracker PC workstation. This ensures proper operation of the Tracker software and makes troubleshooting easier, if a communication failure occurs.
>
> Modem specifications are subject to change. For a current list of specified modems, contact your local Trane office.

1. Connect a RJ-11 cable (standard telephone cable) into the RJ-11 port on the bottom side of the controller (Figure 24 on page 48).

2. Connect the other end of the cable to a phone jack, a port on an external modem, or the PC workstation modem port (Figure 26 on page 51). The incoming modem port is typically labeled "Line" or "Line in."

> **Note:**
> Use the Tracker software to set the communication port that the modem will use.

Figure 26. Tracker modem connection to a PC workstation

RJ-11 modem port
(bottom side)

RJ-11 cable

Phone jack

RJ-11 modem port
(back)

Tracker
PC Workstation
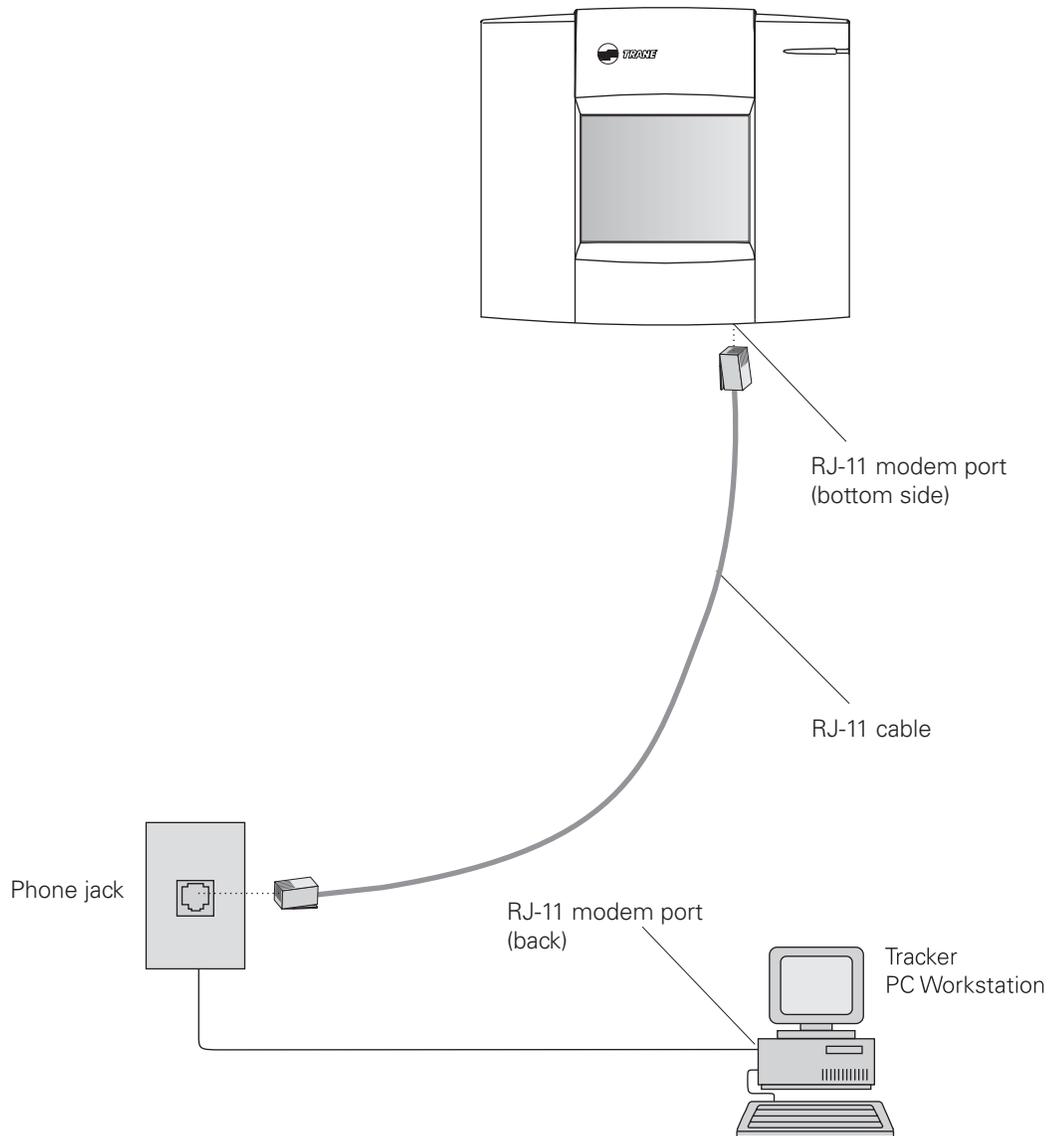
Ethernet connection to PC workstation

Connecting over an existing LAN

To make an Ethernet LAN connection between the Tracker controller and a Tracker PC Workstation through an existing customer LAN, you need two CAT 5 patch cables.

1. Connect one end of the first CAT 5 patch cable to the RJ-45 Ethernet port on the bottom side of the Tracker controller (Figure 27 on page 52).

2. Connect the other end of the cable to an RJ-45 Ethernet wall jack near the controller.

3. Connect one end of the second CAT 5 patch cable to an RJ-45 Ethernet wall jack near the Tracker PC Workstation.

4. Connect the other end of the cable to the RJ-45 Ethernet port on the PC workstation.

Figure 27. Tracker Ethernet LAN connection to a PC workstation over an existing LAN
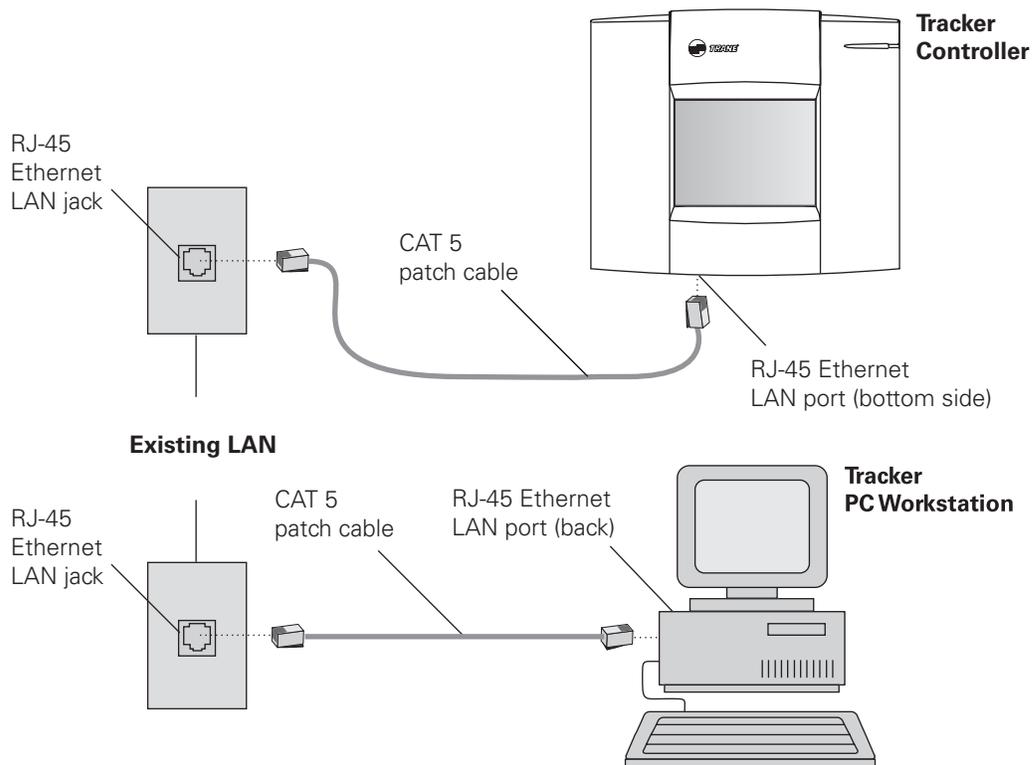
Connecting through a hub

To make an Ethernet connection between the Tracker controller and a Tracker PC Workstation through a hub, you need two CAT 5 patch cables.

1. Connect one end of the first CAT 5 patch cable to the RJ-45 Ethernet port on the bottom side of the Tracker controller (Figure 27 on page 52).

2. Connect the other end of the cable to an RJ-45 Ethernet port on the hub.

3. Connect one end of the second CAT 5 patch cable to an RJ-45 Ethernet port on the hub.

4. Connect the other end of the cable to the RJ-45 Ethernet port on the Tracker PC Workstation.

Figure 28. Tracker Ethernet LAN connection to a PC workstation through a hub
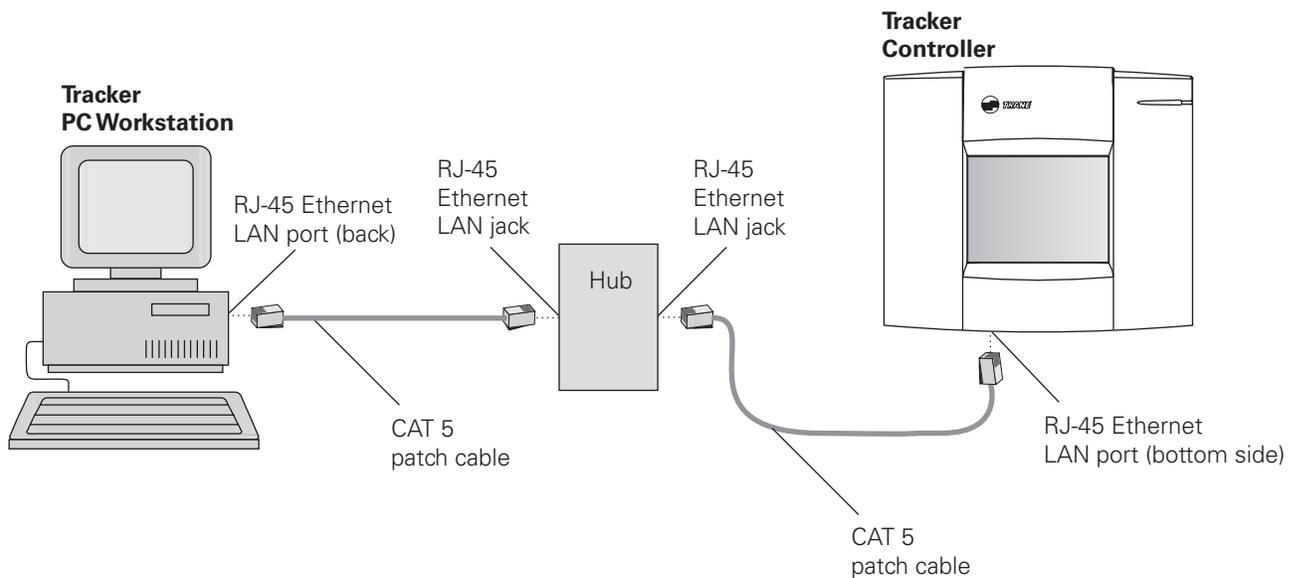
Connecting with one cable

To make an Ethernet connection between the Tracker controller and a Tracker PC Workstation using one cable, you need one CAT 5 crossover cable.

1. Connect one end of the CAT 5 crossover cable to the RJ-45 Ethernet LAN port on the bottom side of the Tracker controller (Figure 29).

2. Connect the other end of the cable to the RJ-45 Ethernet LAN port on the Tracker PC Workstation.

Figure 29. Tracker Ethernet LAN connection to a PC workstation with one cable
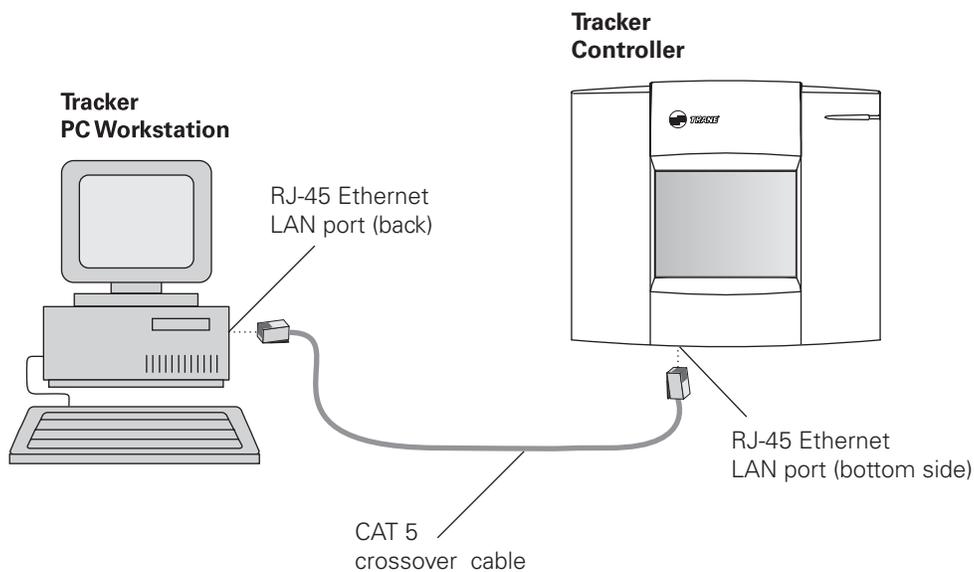
Troubleshooting

Troubleshooting components

Light-emitting diodes (LEDs) and service pin buttons are used for
troubleshooting the Tracker system.

LEDs

The LEDs on the Tracker controller main logic board and display module
show central processing unit (CPU) status and traffic on the Comm5
communication link, the Ethernet module, and the EIA-232 connection.
Figure 30 shows the location of the main logic board LEDs; Table 11 on
page 57 provides a description of them. Figure 30 shows the location of
the Ethernet module LEDs; Table 11 on page 57 provides a description of
them. Figure 7 on page 7 shows the location of the alarm LED on the
display module; Table 12 on page 57 provides a description of it.

Service pin buttons and jumper

Table 13 on page 58 describes the service pin buttons that are located on
the main logic board. They are used for rebooting the controller and for
Neuron identification. The table also describes the jumper that is on the
main logic board.

Figure 30. Tracker controller main logic board component location
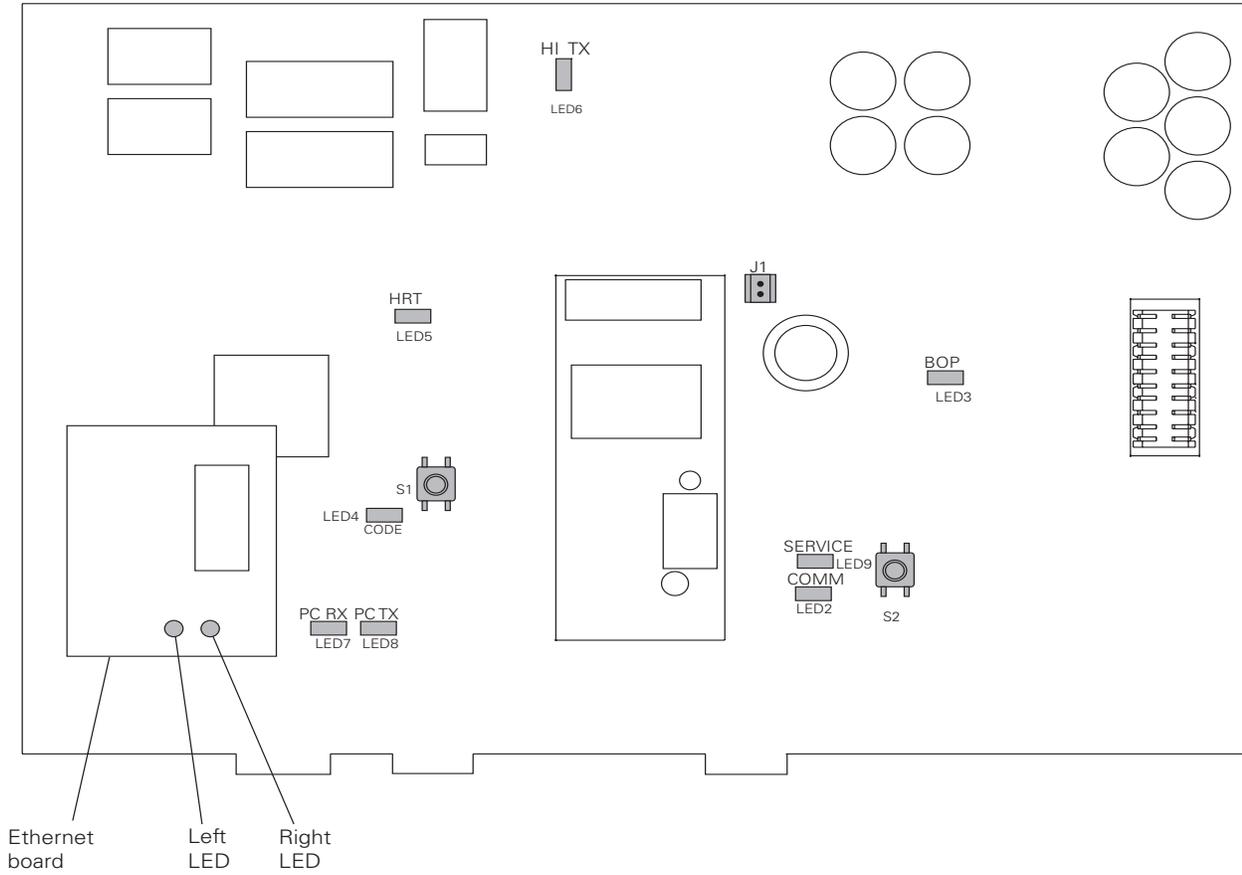
Table 11. Tracker main logic board LEDs

LED name	LED number	Color	Description
HI TX	LED6	Green	Flashes when the main module attempts to communicate with the display module. The main module attempts to communicate with the display module even when the display module is not installed. With no display module installed, the LED flashes every two seconds.
HRT	LED5	Green	Shows the status (heart beat) of the CPU. This LED is on continuously while the controller boots up. It flashes to show processor activity.
CODE	LED4	Red	Shows the status of the controller operating code. This LED is on continuously while the controller is booting up and/or whenever the controller needs operating code. Note: Code can be downloaded to the Tracker controller with the use of the Tracker PC software if this LED is on.
PC RX	LED7	Green	Shows that EIA-232 traffic is on the PC port. This LED is normally off. Flashes when the controller receives data from the PC.
PC TX	LED8	Green	Shows that EIA-232 traffic is on the PC port. This LED is normally off. Flashes when the controller transmits data to the PC.
BOP	LED3	Red	Flashes when the controller binary output relay is energized and when an appropriate alarm condition exists.
SERVICE	LED9	Red	Shows that Comm5 service is required. This LED is normally off. LED is on continuously to show that controller hardware is defective. LED is on continuously to show that the Service pin button (SW2) was pressed. Flashes to show that the controller must be rebooted.
COMM	LED2	Yellow	Shows that network traffic is on the Comm5 link. Flashes when the controller receives data from a Comm5 device.
Left LED	None	Green	Shows that an Ethernet link is detected.
Right LED	None	Green	Shows that there is serial traffic between the Ethernet module and the Tracker main logic board.

Table 12. Alarm LED

State	Color	Description
Normal	Green	LED is on continuously when the controller is operating normally and has received no alarms of the appropriate severity.
Alarm	Red	Flashes when the controller receives an alarm of the appropriate severity. To acknowledge the alarm and turn off the LED, press the Alarm function button displayed on the user interface home screen.

Table 13. Main logic board service pin buttons and jumper

Service pin buttons/jumper	Function
S1	This service pin is the reset button. Pressing S1 reboots the controller. It starts the same operation as does rebooting the controller from either the controller or the PC software. All RAM data is permanently lost. Note: Before pressing this button, attempt to restart the controller by cycling power; this method retains the RAM image.
S2	Momentarily pressing this service pin button causes the controller to broadcast Neuron ID and Program ID. This action also turns on LED9.
J1	This jumper is for factory use only. It must always remain in place. If removed, the backup capacitor will not charge and data may be lost if power is lost.

Symptom/action troubleshooting

Table 14 provides a list of symptoms that indicate a problem in the Tracker system. For each symptom, the table provides one or more actions that you can perform in an attempt to resolve the problem.

Table 14. Symptom/action troubleshooting

Symptom	Action
Tracker controller does not communicate by modem.	• Verify that the telephone cable is connected to the PC modem port (Figure 24 on page 48). • Verify that the phone line is an analog line (not digital). • Perform the modem self-test procedure from the display module. Note: The modem is an integral component of the main module and is not field replaceable. Replacement of the modem requires replacement of the main module.
Tracker controller does not communicate by EIA-232 port.	• Verify that the cable is connected to the PC direct connect port (Figure 24 on page 48). • Verify that the proper cable is used. (Refer to Table 10 on page 47.) • Verify that the PC workstation is using the Tracker controller software; other communications software will not work. • Look for activity on the PC RX LED (Figure 30 on page 56).
Tracker controller did not discover UCMs when initially started.	When the controller is initially powered up, it automatically discovers all communicating UCMs of the proper type and installs them into its database. The discovery process takes several minutes, depending on how many UCMs are installed on the communication link. After the controller has built its database after the initial power up, the controller no longer automatically discovers UCMs. If you want to initiate the discovery process, you must do so manually. Initiate the discovery process when a new UCM is added to the system or an existing UCM is replaced. • Verify proper wiring of the Comm5 communication link. (UCMs can be discovered only if Comm5 communication has been established.) • Wait at least 5 minutes for the controller to discover the UCMs. Note: You can press the service pin button on a UCM at any time to check if it is communicating with the controller. Pressing the service pin button causes the UCM status LED to flash on and off (known as "winking"), if the controller is communicating with that UCM.
Touch screen beeps when touched but does not progress to the next screen.	Touch screen is out of calibration. • Perform the procedures for calibrating the touch screen in *Tracker Building Automation System Controller Operations* guide (BMT-SVU01A-EN).
Touch-screen back light and contrast is out of adjustment.	• Perform the adjust brightness and contrast procedure from the display module.
Tracker I/O status is wrong.	• Verify electrical connection using the post-installation checklist (Table 18 on page 70). • Verify I/O status as indicated on home display on the display module. • Display Tracker I/O status self test from display module.

Table 14. Symptom/action troubleshooting (Continued)

Symptom	Action
Tracker alarm output is not working as expected.	• Confirm proper wiring of the alarm relay output. Consult the post-installation checklist (Table 18 on page 70) for details. • Initiate the BOP self test from the display module. Note: The binary output is for alarm notification only. There must be an unacknowledged alarm present of the proper severity to actuate the alarm output.
Tracker controller will not communicate with its UCMs.	• Look for wiring problems (shorts or opens, for example) that develop when wire is damaged during installation. • Look for shorts between the two conductors resulting from nicks in the insulating jacket. (This can be caused by improper technique when stripping away the outer jacket and shield.) • Look for a strong source of EMI/RFI interference nearby. • Look for ac power disturbances from nearby transformers and electrical equipment. This is especially true when running communication links in close proximity to florescent lighting ballasts. • Verify the UCM has not failed. • Verify proper termination resistance.
Tracker processor is locked up.	• Cycle power to the Tracker main module by removing it from the termination module. • If the processor is still locked up after cycling power to the controller, perform a reboot from the display module or the PC software (if the controller is able to communicate). • If the controller will not respond to the above listed methods, push the reset button (S1) on the main module (see Figure 30 on page 56). Note: Heartbeat LED (HRT LED5) will be solid green.
Alarm LED on the display is flashing red.	• At the Tracker controller user interface home screen, push the alarm button on the display module to acknowledge the alarm, then take the proper corrective action. Note: The alarm LED flashes when the controller receives an alarm of the appropriate severity. Pressing the Alarm button acknowledges the alarm and turns off the flashing LED (until the controller receives another alarm of the appropriate severity).
Tracker controller is annunciating an alarm.	• At the Tracker controller user interface home screen, push the alarm button on the display module to acknowledge the alarm, then take the proper corrective action. Note: The alarm relay energizes when the controller receives an alarm of the appropriate severity. Pressing the alarm button acknowledges the alarm and turns off the alarm relay output (until the controller receives another alarm of the appropriate severity).
Display module is not illuminated.	• Press anywhere on the touch screen surface to turn the back light on. The controller automatically turns off the back light during extended periods of inactivity to conserve energy and bulb life. • Confirm that the controller has 24 Vac power. When the display module has power, the alarm LED will be either solid green or flashing red.
Display module does not respond to the touch.	• Confirm that the controller has 24 Vac power. When the display module has power, the alarm LED will be either solid green or flashing red. • If the display module is not responding correctly when the display module is powered up and the back light is on, initiate the touch-screen calibration procedure from the display module.

Table 14. Symptom/action troubleshooting (Continued)

Symptom	Action
Tracker controller displays the wrong date.	• Verify if the electrical power has been off for more than 1 week (the actual time varies depending on storage temperature). • Verify that jumper pin J1 on the main module is in place. Note: The controller default date (displayed when the controller is initially powered up or whenever the super capacitor is unable to back up the controller time) is January 1, 2000.
Outdoor air temperature is not reading correctly.	• Measure the resistance of the outdoor air temperature thermistor (preferably at the termination module). Check the measurement using Table 19 on page 71. • Inspect the location of the outdoor air temperature sensor. It must not be mounted in the sunlight or near another source of radiant heat. Note: The outdoor air temperature sensor can be used for this purpose only.
Ethernet link is not detected (on the Ethernet board, the left LED is off)	• Verify that the correct type of cable is used. When communicating over a network, use a patch cable. When communicating to an Ethernet card on a lap top computer, use a crossover cable.

Chapter 8

Maintenance

The only maintenance necessary for the controller is to occasionally clean and calibrate the touch screen.

Cleaning the touch screen

To clean the touch screen, wipe it off with a non-abrasive cloth. For more aggressive cleaning, use low-pressure compressed air to blow off the surface and then wipe it off with a non-abrasive cloth.

To clean fingerprints from the touch screen, lightly spray it with a mild glass cleaner. Immediately wipe the touch screen with an absorbent, non-abrasive cloth.

CAUTION
Avoid Equipment Damage!
Immediately wipe moisture from the surface of the LCD touch screen. Failure to do so will cause the operator display to malfunction.

Calibrating the touch screen

To calibrate the touch screen:

1. At the Tracker home screen, press the Advanced button. The Advanced Selections screen displays.

2. Press the Calibrate Touch Screen button. A calibration screen displays.

CAUTION
Avoid Equipment Damage!
Do not allow the touch screen to come in contact with sharp objects.

3. Touch the target using a small, pliable, blunt object, such as a pencil eraser. Hold until the beeping stops. A second calibration screen displays.

4. Again, touch the target with the object. Hold until the beeping stops. The Advanced Selection screen displays.

5. To exit this procedure, press the Home button. The home screen displays.

Appendix A

Installation checklists

Required supplies

Table 15 lists the supplies required for all Tracker installations.

Table 15. Required supplies checklist

☑	Wiring installation	Item
☐ ☐	24 Vac	18 AWG (1.02 mm^2) wire recommended 24 Vac, 40 VA minimum transformer
☐	Comm	Communication wire (see Table 7 on page 30 and Table 8 on page 31 for specifications)

Optional supplies

Table 16 lists the supplies that may or may not be necessary, depending on the Tracker installation.

Table 16. Optional supplies checklist

☑	Inputs/output wiring installation	Item
☐	Alarm relay wiring	18 AWG (1.02 mm^2) wire and metal conduit
☐	Priority shutdown wiring and Meter input	18—22 AWG (1.02 mm^2—0.643 mm^2) wire and metal conduit
☐	Thermistor wire	18—22 AWG (1.02 mm^2—0.643 mm^2) twisted pair, shielded wire
☐	Alarm relay power supply	Power supply for alarm relay output (not to exceed 24 Vac)
☐	Alarm relay output load	Load for alarm relay output (not to exceed 1 amp at 24 Vac)
☐	Thermistor	Outdoor air temperature sensor

Comm5 UCM identification and location

Each UCM has a unique 12-digit identifier that serves as its address. The Tracker controller uses the address to communicate with the UCM. The installer must know the UCM addresses when assigning names to UCMs during setup.

Use Table 17 to record the name, location, and ID of each UCM (SCCs, VariTrac CCPs, and I/O modules) connected to the Comm5 link. The 12-digit identifier is on a sticker attached to the UCM. Some UCMs have peel-away stickers that can be detached and applied to the table.

Table 17. Comm5 UCM identification and location

Space Comfort Controllers (24 maximum)		
Edited name	Location or area served	12 digit ID

Table 17. Comm5 UCM identification and location (Continued)

Space Comfort Controllers (continued)		
Edited name	Location or area served	12 digit ID

Table 17. Comm5 UCM identification and location (Continued)

VariTrac central control panels (10 maximum)		
Edited name	Location or area served	12 digit ID
I/O modules (4 maximum)		
Edited name	Location or area served	12 digit ID

Pre-installation wiring notes

The wiring for the Tracker system will have been completed prior to Tracker installation. All Tracker wiring conforms to the following guidelines:

- The Tracker controller receives 24 Vac from a dedicated power circuit. If not, the Tracker controller may malfunction.
- Each UCM receives 24 Vac from a dedicated power source. If not, the UCM may malfunction.
- Input wires and ac power wires are run in separate conduits or wire bundles. If not, the Tracker controller may malfunction due to induced electrical noise.
- Comm5 cable and ac power wires are run in separate conduits or wire bundles. If not, the Tracker controller may malfunction due to induced electrical noise.
- UCM communication cables do not run near lighting ballasts or other transformers. If they do, the UCM may malfunction due to induced electrical noise.

Termination module post-installation checklist

Use Table 18 to verify that the circuits connected to the termination board on the termination module are wired correctly. Record test results in the "Actual value" column.

Table 18. Termination module post-installation checklist

Circuit	Mandatory wiring	Test	Actual value
24 Vac TB1-1, TB1-2, TB1-3	✓	Measure the voltage between TB1-1 and TB1-2. It must be 24 Vac nominal (19 Vac to 30 Vac).	
		Measure the voltage between TB1-1 and TB1-3. It must be approximately the same voltage as measured between TB1-1 and TB1-2	
		The ground wire must be connected to terminal TB-3. It must be tied to building or earth ground at nearest location. Measure the voltage between TB1-2 and TB1-3. It must be approximately 0 V.	
Alarm relay TB1-4, TB1-5		Measure the voltage between TB1-4 and TB1-5. It must not exceed 24 Vac. Jumper these two terminals. The user-supplied load should now be energized and active.	
Priority shutdown TB1-6, TB1-7		There must be no voltage applied to these terminals. These terminals must be connected to dry contacts only. Measure the resistance between TB1-6 and TB1-7. It must be approximately 0 Ω with the user-supplied contacts in the closed position, and infinity ohms with the contacts in the open position.	
Meter input TB1-8, TB1-9		There must be no voltage applied to these terminals. The terminals must be connected to dry contacts only. Measure the resistance between TB1-8 and TB1-9. It must be approximately 0 Ω with demand meter contacts in the closed position, and infinity ohms with the contacts in the open position.	
Thermistor TB1-10, TB1-11, TB1-12		There must be no voltage applied to these terminals. The cable shield must be connected to terminal TB1-12. Measure the resistance between TB1-10 and TB1-11.	
		Note the approximate temperature at the location of the outdoor air temperature sensor.	
		Compare the resistance and temperature values to the listed values in Table 19 on page 71.	
Comm TB1-13, TB1-14, TB1-15	✓	There must be no voltage applied to these terminals. Measure the resistance between TB1-13 and TB1-14. The resistance must be approximately 50 Ω with daisy-chained wiring. This test confirms the correct usage of the termination resistors as well as the continuity of the wire.	

Table 19. Thermistor sensor electrical characteristics

Temperature (°F)	Temperature (°C)	Sensor resistance (ohms x 1000)
−30	−34	241.1
−20	−29	170.1
−10	−23	121.4
0	−18	87.6
10	−12	63.8
20	−7	46.9
30	−1	34.5
40	4	26.2
50	10	20.0
60	16	15.3
70	21	11.9
77	25	10.0
80	27	9.3
90	32	7.3
100	38	5.8
110	43	4.7
120	49	3.8
130	54	3.0
140	60	2.5
150	66	2.0

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Appendix B

Declaration of Conformity

This appendix provides the Declaration of Conformity statement for the Tracker model 12, 24, and WSHP controllers. All Tracker models are currently CE certified.

Declaration of Conformity

Manufacturer's Name: Trane

Manufacturer's Address: 4833 White Bear Parkway
Saint Paul, Minnesota 55110
USA

The manufacturer hereby declares that the product:

Product Name: Tracker model 12, 24, and water-source heat pump (WSHP)

Product Number:

BMTK000AA0A110	BMTKKBBAB0A110
BMTK000AA0A210	BMTKKBBAB0A210
BMTK000AA0A510	BMTK000AB0A110
BMTKKBBAA0A110	BMTK000AB0A210
BMTKKBBAA0A210	BMTK000AB0A510

Conforms to the following standards or other normative documents:

Electromagnetic Emission: EN 50081-1:1998
(by Council Directive 89/336/EEC) Radiated EN55022: 1998 Class B limit
Conducted EN55022: 1998 Class B limit

Electromagnetic Immunity: EN61000-6-1:2001

EN61000-4-2	±4 kV contact discharge
	±8 kV air discharge
EN61000-4-3	3 V/m
EN61000-4-4	±1 kV
EN61000-4-5	±1 kV
EN61000-4-6	3 V
EN61000-4-11	1 cycle/100%

UL and C-UL listing 916, Energy management equipment

Flammability rating UL 94-5V (UL flammability rating for plenum use)

FCC FCC Part 15, Class A, CFR 47

When and where issued

Electromagnetic Emission : 4/9/2003   Bounheng Saycocie
Electromagnetic Immunity: 4/10/2003   Design/Compliance Engineer
Saint Paul, Minnesota USA

Mark of Compliance   **European Contact**

Societe Trane (Epinal, France)
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